

Ser Gly Met Glu Asp Ile Phe Val Gly Glu Thr Ile Thr Pro Thr Asp  
 290 295 300

Ala Val Glu Ala Leu Pro Ile Leu His Ile Asp Glu Pro Thr Leu Gln  
 305 310 315 320

Met Thr Phe Leu Val Asn Asn Ser Pro Phe Ala Gly Lys Glu Gly Lys  
 325 330 335

Trp Val Thr Ser Arg Lys Val Glu Glu Arg Leu Gln Ala Glu Leu Gln  
 340 345 350

Thr Asp Val Ser Leu Arg Val Asp Pro Thr Asp Ser Pro Asp Lys Trp  
 355 360 365

Thr Val Ser Gly Arg Gly Glu Leu His Leu Ser Ile Leu Ile Glu Thr  
 370 375 380

Met Arg Arg Glu Gly Tyr Glu Leu Gln Val Ser Arg Pro Glu Val Ile  
 385 390 395 400

Val Lys Glu Ile Asp Gly Ile Lys Cys Glu Pro Phe Glu Arg Val Gln  
 405 410 415

Ile Asp Thr Pro Glu Glu Tyr Gln Gly Ser Val Ile Gln Ser Leu Ser  
 420 425 430

Glu Arg Lys Gly Glu Met Leu Asp Met Ile Ser Thr Gly Asn Gly Gln  
 435 440 445

Thr Arg Leu Val Phe Leu Val Pro Ala Arg Gly Leu Ile Gly Tyr Ser  
 450 455 460

Thr Glu Phe Leu Ser Met Thr Arg Gly Tyr Gly Ile Met Asn His Thr  
 465 470 475 480

Phe Asp Gln Tyr Leu Pro Leu Ile Pro Gly Glu Ile Gly Gly Arg His  
 485 490 495

Arg Gly Ala Leu Val Ser Ile Asp Ala Gly Lys Ala Thr Thr Tyr Ser

	500		505		510
Ile Met Ser	Ile Glu Glu Arg Gly Thr Ile Phe Val Asn Pro Gly Thr				
515		520		525	
Glu Val Tyr	Glu Gly Met Ile Ile Gly Glu Asn Ser Arg Glu Asn Asp				
530		535		540	
Leu Thr Val	Asn Ile Thr Lys Ala Lys Gln Met Thr Asn Val Arg Ser				
545		550		555	560
Ala Thr Lys	Asp Gln Thr Ala Val Ile Lys Thr Pro Arg Ile Leu Thr				
	565		570		575
Leu Glu Glu	Ser Leu Glu Phe Leu Asn Asp Asp Glu Tyr Met Glu Val				
	580		585		590
Thr Pro Glu	Ser Ile Arg Leu Arg Lys Gln Ile Leu Asn Lys Ala Glu				
	595		600		605
Arg Glu Lys	Ala Asn Lys Lys Lys Lys Ser Ala Glu				
	610		615		620
<210> 642					
<211> 378					
<212> PRT					
<213> Streptococcus pneumoniae					
<400> 642					
Met Ser Tyr	Lys Thr Ser Asn Ala Glu Gly His Val Asp Phe Ile Asn				
1		5		10	15
Thr Tyr Asp	Leu Glu Pro Met Ala Gln Gln Val Ile Pro Lys Ala Ala				
	20		25		30
Phe Gly Tyr	Ile Ala Ser Gly Ala Glu Asp Thr Phe Thr Leu Arg Glu				
	35		40		45
Asn Ile Arg	Ala Phe Asn His Lys Leu Ile Val Pro His Thr Leu Cys				
	50		55		60
Asn Val Glu	Asn Pro Ser Thr Glu Ile Glu Phe Ala Gly Glu Lys Leu				

65		70		75		80
Ser Ser Pro Ile	Ile Met Ala Pro Val	Ala Ala His Lys	Leu Ala Asn			
	85		90		95	
Glu Gln Gly Glu	Val Ala Thr Ala Arg	Gly Val His Glu	Phe Gly Ser			
	100		105		110	
Leu Tyr Thr Thr	Ser Ser Tyr Ser Thr	Val Asp Leu Pro	Glu Ile Ser			
	115		120		125	
Glu Ala Leu Gln	Gly Thr Pro His Trp	Phe Gln Phe Tyr	Phe Ser Lys			
	130		135		140	
Asp Asp Gly Ile	Asn Arg His Ile Met	Asp Arg Val Lys	Ala Glu Gly			
	145		150		155	160
Tyr Lys Ala Ile	Val Leu Thr Ala Asp	Ala Thr Val Gly	Gly Asn Arg			
	165		170		175	
Glu Val Asp Lys	Arg Asn Gly Phe Val	Phe Pro Val Gly	Met Pro Ile			
	180		185		190	
Val Glu Glu Tyr	Leu Pro Glu Gly Ala	Gly Lys Ser Met	Asp Phe Val			
	195		200		205	
Tyr Lys Ser Ala	Lys Gln Arg Leu Ser	Pro Arg Asp Val	Glu Phe Ile			
	210		215		220	
Ala Glu Tyr Ser	Gly Leu Pro Val Tyr	Val Lys Gly Pro	Gln Cys Arg			
	225		230		235	240
Glu Asp Val Glu	Arg Ser Leu Ala Ala	Gly Ala Ser Gly	Ile Trp Val			
	245		250		255	
Thr Asn His Gly	Gly Arg Gln Ile Asp	Gly Gly Pro Ala	Ala Phe Asp			
	260		265		270	
Ser Leu Gln Glu	Val Ala Glu Ala Val	Asp Arg Arg Val	Pro Ile Val			
	275		280		285	

Phe Asp Ser Gly Val Arg Arg Gly Gln His Val Phe Lys Ala Leu Ala  
 290 295 300

Ser Gly Ala Asp Leu Val Ala Ile Gly Arg Pro Val Ile Tyr Gly Leu  
 305 310 315 320

Ala Leu Gly Gly Ser Val Gly Val Arg Gln Val Phe Glu His Leu Asn  
 325 330 335

Ala Glu Leu Lys Thr Val Met Gln Leu Ser Gly Thr Gln Thr Ile Glu  
 340 345 350

Asp Val Lys His Phe Lys Leu Arg His Asn Pro Tyr Asn Pro Thr Phe  
 355 360 365

Pro Val Asp Pro Arg Asp Leu Lys Leu Tyr  
 370 375

<210> 643

<211> 314

<212> PRT

<213> Streptococcus pneumoniae

<400> 643

Met Ser Glu Pro Leu Phe Leu Gln Ser Val Met Gln Glu Lys Ile Trp  
 1 5 10 15

Gly Gly Ala Lys Leu Arg Asp Glu Phe Gly Tyr Asp Ile Pro Ser Glu  
 20 25 30

Lys Ile Gly Glu Tyr Trp Ala Ile Ser Ala His Pro Asn Gly Val Ser  
 35 40 45

Lys Val Ala Asn Gly Arg Tyr Glu Gly Thr Asp Leu Ala Thr Leu Tyr  
 50 55 60

Ala Glu His Arg Glu Leu Phe Gly Asn Arg Pro Glu Pro Val Phe Pro  
 65 70 75 80

Leu Leu Thr Lys Ile Leu Asp Ala Asn Asp Trp Leu Ser Val Gln Val  
 85 90 95

His Pro Asp Asp Ala Tyr Gly Leu Glu His Glu Gly Glu Leu Gly Lys  
 100 105 110

Thr Glu Cys Trp Tyr Ile Ile Ala Ala Asp Glu Gly Ser Glu Ile Ile  
 115 120 125

Tyr Gly His Asn Ala Lys Ser Lys Glu Glu Leu Arg Gln Gln Ile Glu  
 130 135 140

Asp Lys Asn Trp Asp Asp Leu Leu Thr Lys Val Pro Val Lys Ala Gly  
 145 150 155 160

Asp Phe Phe Tyr Val Pro Ser Gly Thr Met His Ala Ile Gly Ala Gly  
 165 170 175

Ile Leu Ile Leu Glu Thr Gln Gln Ser Ser Asp Thr Thr Tyr Arg Val  
 180 185 190

Tyr Asp Phe Asp Arg Lys Asp Asp Lys Gly Asn Leu Arg Glu Leu His  
 195 200 205

Leu Glu Lys Ser Ile Asp Val Leu Asn Ile Gly Glu Pro Ala Asn Ser  
 210 215 220

Arg Pro Val Thr Val Lys Ala Asp Asp Leu Arg Ser Thr Leu Leu Val  
 225 230 235 240

Ser Asn Asp Phe Phe Ala Val Tyr Lys Trp Glu Ile Thr Gly Lys Val  
 245 250 255

Asp Phe Glu Lys Thr Ala Asp Tyr Ser Leu Leu Ser Val Leu Ala Gly  
 260 265 270

Gln Gly Gln Leu Thr Val Asp Gly Lys Asn Tyr Pro Ile Gln Lys Gly  
 275 280 285

Ser His Phe Ile Leu Pro Ser Asp Val Glu Ala Trp Thr Leu Glu Gly  
 290 295 300

Gln Gly Leu Glu Leu Ile Val Ser His Pro  
 305 310

<210> 644  
 <211> 281  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 644

Met Thr Trp Lys Ile Ile Ala Asp Ser Gly Cys Asp Tyr Arg Gln Leu  
 1 5 10 15

Pro Thr Pro Ala Ile Asn Thr Thr Phe Val Ser Val Pro Leu Thr Ile  
 20 25 30

Gln Val Ala Asp Gln Val Phe Val Asp Asp Ala Ser Leu Asp Ile Asp  
 35 40 45

Gln Met Met Glu Thr Met Tyr Ala Thr Ala Glu Ala Ser Lys Ser Ala  
 50 55 60

Cys Pro Ser Pro Asp Asp Tyr Leu Arg Ala Phe Glu Gly Ala Lys Asn  
 65 70 75 80

Ile Phe Leu Val Thr Ile Thr Gly Thr Leu Ser Gly Ser His Asn Ser  
 85 90 95

Ala Gln Leu Ala Lys Asn Ile Tyr Leu Glu Asp His Pro Asp Thr Lys  
 100 105 110

Ile His Val Ile Asp Ser Leu Ser Ala Gly Gly Glu Val Asp Leu Leu  
 115 120 125

Val Glu Lys Leu Asn Asp Leu Ile Asp Gln Gly Leu Ser Phe Glu Glu  
 130 135 140

Val Val Glu Ala Ile Thr Ala Tyr Gln Glu Lys Thr Lys Leu Leu Phe  
 145 150 155 160

Val Leu Ala Lys Val Asp Asn Leu Val Lys Asn Gly Arg Leu Ser Lys  
 165 170 175

Leu Ile Gly Thr Val Val Gly Leu Leu Asn Ile Arg Met Val Gly Lys  
 180 185 190

Ala Ser Glu Thr Gly Thr Leu Glu Leu Leu Gln Lys Ala Arg Gly Ser  
 195 200 205

Lys Lys Ser Val Gln Ala Ala Tyr Asp Glu Leu Val Lys Ala Gly Tyr  
 210 215 220

Ala Gly Gly Arg Ile Val Met Ala Gln Arg Asn Asn Glu Lys Cys Cys  
 225 230 235 240

Gln Gln Leu Ser Glu Arg Ile Arg Glu Thr Phe Pro Gln Ala Asp Ile  
 245 250 255

Lys Ile Leu Pro Thr Ser Gly Leu Cys Ser Phe Tyr Ala Glu Glu Gly  
 260 265 270

Gly Leu Leu Met Gly Tyr Glu Ile Asp  
 275 280

<210> 645  
 <211> 216  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 645

Met Lys Glu Gly Ile Pro Lys Met Gly Lys Ile Glu Val Ile Asn His  
 1 5 10 15

Pro Leu Ile Gln His Lys Leu Ser Ile Leu Arg Arg Thr Asp Thr Ser  
 20 25 30

Thr Lys Ala Phe Arg Glu Leu Val Asp Glu Ile Ala Met Leu Met Gly  
 35 40 45

Tyr Glu Val Leu Arg Asp Leu Pro Leu Glu Asp Val Glu Ile Glu Thr  
 50 55 60

Pro Ile Thr Lys Thr Val Gln Lys Gln Leu Ala Gly Lys Lys Leu Ala  
 65 70 75 80

Ile Val Pro Ile Leu Arg Ala Gly Ile Gly Met Val Asp Gly Leu Leu  
 85 90 95

Asn Leu Val Pro Ala Ala Lys Val Gly His Ile Gly Met Tyr Arg Asp  
 100 105 110

Glu Glu Thr Leu Gln Pro Val Glu Tyr Leu Val Lys Leu Pro Glu Asp  
 115 120 125

Ile Asp Gln Arg Gln Ile Phe Val Val Asp Pro Met Leu Ala Thr Gly  
 130 135 140

Gly Ser Ala Ile Leu Ala Val Asp Ser Leu Lys Lys Arg Gly Ala Ser  
 145 150 155 160

Asn Ile Lys Phe Val Cys Leu Val Ser Ala Pro Glu Gly Val Lys Ala  
 165 170 175

Leu Gln Glu Ala His Pro Asp Val Glu Ile Phe Thr Ala Ala Leu Asp  
 180 185 190

Glu Arg Leu Asn Glu His Gly Tyr Ile Val Pro Gly Leu Gly Asp Ala  
 195 200 205

Gly Asp Arg Leu Phe Gly Thr Lys  
 210 215

<210> 646  
 <211> 252  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 646

Met Ile Ser Pro Ser Ala Thr Gln Asp Gly Leu Thr Lys Gly Gln Asp  
 1 5 10 15

Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser Phe Gln Gly Lys Ile Ile  
 20 25 30

Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala Lys Lys Val Val Leu Tyr  
 35 40 45

Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly Ile Ala Lys Ser Phe Arg  
 50 55 60



Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp Glu Thr Phe Val Ala Gly  
 65 70 75 80

Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys Met Lys Gly Lys Asp Phe  
 85 90 95

Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn Glu Ala Gly Lys Ile Val  
 100 105 110

Asn Gln Ala Arg Gly Met Gly Ile Asp Lys Pro Ile Val Gly Gly Asp  
 115 120 125

Gly Phe Asn Gly Glu Glu Phe Val Gln Gln Ala Thr Ala Glu Lys Ala  
 130 135 140

Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser Thr Thr Val Glu Val Ser  
 145 150 155 160

Ala Lys Ala Lys Ala Phe Leu Asp Ala Tyr Arg Ala Lys Tyr Asn Glu  
 165 170 175

Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr Asp Ser Val His Leu Val  
 180 185 190

Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser Gly Glu Ile Lys Asn Asn  
 195 200 205

Leu Ala Lys Thr Lys Asp Phe Glu Gly Val Thr Gly Gln Thr Ser Phe  
 210 215 220

Asp Ala Asp His Asn Thr Val Lys Thr Ala Tyr Met Met Thr Met Asn  
 225 230 235 240

Asn Gly Lys Val Glu Ala Ala Glu Val Val Lys Pro  
 245 250

<210> 647

<211> 396

<212> PRT

<213> Streptococcus pneumoniae

<400> 647

Met Ser Glu Arg Lys Leu Phe Thr Ser Glu Ser Val Ser Glu Gly His  
1 5 10 15

Pro Asp Lys Ile Ala Asp Gln Ile Ser Asp Ala Ile Leu Asp Ala Ile  
20 25 30

Leu Ala Lys Asp Pro Glu Ala His Val Ala Ala Glu Thr Ala Val Tyr  
35 40 45

Thr Gly Ser Val His Val Phe Gly Glu Ile Ser Thr Asn Ala Tyr Val  
50 55 60

Asp Ile Asn Arg Val Val Arg Asp Thr Ile Ala Glu Ile Gly Tyr Thr  
65 70 75 80

Asn Thr Glu Tyr Gly Phe Ser Ala Glu Thr Val Gly Val His Pro Ser  
85 90 95

Leu Val Glu Gln Ser Pro Asp Ile Ala Gln Gly Val Asn Glu Ala Leu  
100 105 110

Glu Val Arg Gly Asn Ala Asp Gln Asp Pro Leu Asp Leu Ile Gly Ala  
115 120 125

Gly Asp Gln Gly Leu Met Phe Gly Phe Ala Val Asp Glu Thr Glu Glu  
130 135 140

Leu Met Pro Leu Pro Ile Ala Leu Ser His Lys Leu Val Arg Arg Leu  
145 150 155 160

Ala Glu Leu Arg Lys Ser Gly Glu Ile Ser Tyr Leu Arg Pro Asp Ala  
165 170 175

Lys Ser Gln Val Thr Val Glu Tyr Asp Glu Asn Asp Arg Pro Val Arg  
180 185 190

Val Asp Thr Val Val Ile Ser Thr Gln His Asp Pro Glu Ala Thr Asn  
195 200 205

Glu Gln Ile His Gln Asp Val Ile Asp Lys Val Ile Lys Glu Val Ile  
210 215 220

Pro Ser Ser Tyr Leu Asp Asp Lys Thr Lys Phe Phe Ile Asn Pro Thr  
 225 230 235 240

Gly Arg Phe Val Ile Gly Gly Pro Gln Gly Asp Ser Gly Leu Thr Gly  
 245 250 255

Arg Lys Ile Ile Val Asp Thr Tyr Gly Gly Tyr Ser Arg His Gly Gly  
 260 265 270

Gly Ala Phe Ser Gly Lys Asp Ala Thr Lys Val Asp Arg Ser Ala Ser  
 275 280 285

Tyr Ala Ala Arg Tyr Ile Ala Lys Asn Ile Val Ala Ala Asp Leu Ala  
 290 295 300

Lys Lys Ala Glu Val Gln Leu Ala Tyr Ala Ile Gly Val Ala Gln Pro  
 305 310 315 320

Val Ser Val Arg Ile Asp Thr Phe Gly Thr Gly Thr Val Ala Glu Ser  
 325 330 335

Gln Leu Glu Lys Ala Ala Arg Gln Ile Phe Asp Leu Arg Pro Ala Gly  
 340 345 350

Ile Ile Gln Met Leu Asp Leu Lys Arg Pro Ile Tyr Arg Gln Thr Ser  
 355 360 365

Ala Tyr Gly His Met Gly Arg Thr Asp Ile Asp Leu Pro Trp Glu Arg  
 370 375 380

Leu Asp Lys Val Asp Ala Leu Lys Glu Ala Val Lys  
 385 390 395

<210> 648

<211> 90

<212> PRT

<213> Streptococcus pneumoniae

<400> 648

Met Ala Val Lys Ile Arg Leu Thr Arg Met Gly Ser Lys Lys Lys Pro  
 1 5 10 15

Phe Tyr Arg Ile Asn Val Ala Asp Ser Arg Ser Pro Arg Asp Gly Arg  
 20 25 30

Phe Ile Glu Thr Val Gly Thr Tyr Asn Pro Leu Val Ala Glu Asn Gln  
 35 40 45

Val Thr Leu Lys Glu Asp Arg Val Leu Ala Trp Leu Ala Asn Gly Ala  
 50 55 60

Gln Pro Ser Asp Thr Val Arg Asn Ile Leu Ser Lys Glu Gly Val Leu  
 65 70 75 80

Lys Lys Phe His Asp Ser Lys Phe Ser Lys  
 85 90

<210> 649

<211> 112

<212> PRT

<213> Streptococcus pneumoniae

<400> 649

Met Gln Val Ile Lys Arg Asn Gly Glu Ile Ala Glu Phe Asn Pro Asp  
 1 5 10 15

Lys Ile Tyr Gln Ala Ile Leu Lys Ala Ala Gln Thr Val Tyr Val Leu  
 20 25 30

Thr Asp Asp Leu Arg Gln Asn Leu Ala Gln Val Thr Lys Lys Val Val  
 35 40 45

Leu Asp Leu Gln Glu Ala Lys Val Glu Arg Ala Thr Ile Ser Met Ile  
 50 55 60

Gln Ser Met Val Glu His Arg Leu Leu Gly Ala Gly Tyr Ile Thr Ile  
 65 70 75 80

Ala Glu His Tyr Ile Ser Tyr Arg Leu Gln Arg Asp Leu Glu Arg Ser  
 85 90 95

Gly Tyr Gly Asp His Ile Ala Val His Leu His Phe Glu Gln Ile Arg  
 100 105 110

<210> 650  
 <211> 752  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 650

Met Leu Cys Gln Asn Cys Lys Ile Asn Asp Ser Thr Ile His Leu Tyr  
 1 5 10 15

Thr Asn Leu Asn Gly Lys Gln Lys Gln Ile Asp Leu Cys Gln Asn Cys  
 20 25 30

Tyr Lys Ile Ile Lys Thr Asp Pro Asn Asn Ser Leu Phe Lys Gly Met  
 35 40 45

Thr Asp Leu Asn Asn Arg Asp Phe Asp Pro Phe Gly Asp Phe Phe Asn  
 50 55 60

Asp Leu Asn Asn Phe Arg Pro Ser Ser Asn Thr Pro Pro Ile Pro Pro  
 65 70 75 80

Thr Gln Ser Gly Gly Gly Tyr Gly Gly Asn Gly Gly Tyr Gly Ser Gln  
 85 90 95

Asn Arg Gly Ser Ala Gln Thr Pro Pro Pro Ser Gln Glu Lys Gly Leu  
 100 105 110

Leu Glu Glu Phe Gly Ile Asn Val Thr Glu Ile Ala Arg Arg Gly Asp  
 115 120 125

Ile Asp Pro Val Ile Gly Arg Asp Asp Glu Ile Ile Arg Val Ile Glu  
 130 135 140

Ile Leu Asn Arg Arg Thr Lys Asn Asn Pro Val Leu Ile Gly Glu Pro  
 145 150 155 160

Gly Val Gly Lys Thr Ala Val Val Glu Gly Leu Ala Gln Lys Ile Val  
 165 170 175

Asp Gly Asp Val Pro His Lys Leu Gln Gly Lys Gln Val Ile Arg Leu  
 180 185 190

Asp Val Val Ser Leu Val Gln Gly Thr Gly Ile Arg Gly Gln Phe Glu  
 195 200 205

Glu Arg Met Gln Lys Leu Met Glu Glu Ile Arg Lys Arg Glu Asp Ile  
 210 215 220

Ile Leu Phe Ile Asp Glu Ile His Glu Ile Val Gly Ala Gly Ser Ala  
 225 230 235 240

Ser Asp Gly Asn Met Asp Ala Gly Asn Ile Leu Lys Pro Ala Leu Ala  
 245 250 255

Arg Gly Glu Leu Gln Leu Val Gly Ala Thr Thr Leu Asn Glu Tyr Arg  
 260 265 270

Ile Ile Glu Lys Asp Ala Ala Leu Glu Arg Arg Met Gln Pro Val Lys  
 275 280 285

Val Asp Glu Pro Thr Val Asp Glu Thr Ile Thr Ile Leu Lys Gly Ile  
 290 295 300

Gln Lys Lys Tyr Glu Asp Tyr His His Val Gln Tyr Thr Asp Ala Ala  
 305 310 315 320

Ile Glu Ala Ala Ala Thr Leu Ser Asn Arg Tyr Ile Gln Asp Arg Phe  
 325 330 335

Leu Pro Asp Lys Ala Ile Asp Leu Leu Asp Glu Ala Gly Ser Lys Met  
 340 345 350

Asn Leu Thr Leu Asn Phe Val Asp Pro Lys Val Ile Asp Gln Arg Leu  
 355 360 365

Ile Glu Ala Glu Asn Leu Lys Ser Gln Ala Thr Arg Glu Glu Asp Phe  
 370 375 380

Glu Lys Ala Ala Tyr Phe Arg Asp Gln Ile Ala Lys Tyr Lys Glu Met  
 385 390 395 400

Gln Lys Lys Lys Ile Thr Asp Gln Asp Thr Pro Ser Ile Ser Glu Lys

405	410	415
Thr Ile Glu His Ile Ile Glu Gln Lys Thr Asn Ile Pro Val Gly Asp 420 425 430		
Leu Lys Glu Lys Glu Gln Ser Gln Leu Ile His Leu Ala Glu Asp Leu 435 440 445		
Lys Ser His Val Ile Gly Gln Asp Asp Ala Val Asp Lys Ile Ala Lys 450 455 460		
Ala Ile Arg Arg Asn Arg Val Gly Leu Gly Thr Pro Asn Arg Pro Ile 465 470 475 480		
Gly Ser Phe Leu Phe Val Gly Pro Thr Gly Val Gly Lys Thr Glu Leu 485 490 495		
Ser Lys Gln Leu Ala Ile Glu Leu Phe Gly Ser Ala Asp Ser Met Ile 500 505 510		
Arg Phe Asp Met Ser Glu Tyr Met Glu Lys His Ser Val Ala Lys Leu 515 520 525		
Val Gly Ala Pro Pro Gly Tyr Val Gly Tyr Asp Glu Ala Gly Gln Leu 530 535 540		
Thr Glu Lys Val Arg His Asn Pro Tyr Ser Leu Ile Leu Leu Asp Glu 545 550 555 560		
Val Glu Lys Ala His Pro Asp Val Met His Met Phe Leu Gln Val Leu 565 570 575		
Asp Asp Gly Arg Leu Thr Asp Gly Gln Gly Arg Thr Val Ser Phe Lys 580 585 590		
Asp Ala Ile Ile Ile Met Thr Ser Asn Ala Gly Thr Gly Lys Thr Glu 595 600 605		
Ala Ser Val Gly Phe Gly Ala Ala Arg Glu Gly Arg Thr Asn Ser Val 610 615 620		

Leu Gly Glu Leu Gly Asn Phe Phe Ser Pro Glu Phe Met Asn Arg Phe  
625 630 635 640

Asp Gly Ile Ile Glu Phe Lys Ala Leu Ser Lys Asp Asn Leu Leu Gln  
645 650 655

Ile Val Glu Leu Met Leu Ala Asp Val Asn Lys Arg Leu Ser Ser Asn  
660 665 670

Asn Ile Arg Leu Asp Val Thr Asp Lys Val Lys Glu Lys Leu Val Asp  
675 680 685

Leu Gly Tyr Asp Pro Lys Met Gly Ala Arg Pro Leu Arg Arg Thr Ile  
690 695 700

Gln Asp Tyr Ile Glu Asp Thr Ile Thr Asp Tyr Tyr Leu Glu Asn Pro  
705 710 715 720

Ser Glu Lys Asp Leu Lys Ala Val Met Thr Ser Lys Gly Asn Ile Gln  
725 730 735

Ile Lys Ser Ala Lys Lys Ala Glu Val Lys Ser Ser Glu Lys Glu Lys  
740 745 750

<210> 651  
<211> 400  
<212> PRT  
<213> Streptococcus pneumoniae

<400> 651

Met Asn Glu Phe Glu Asp Leu Leu Asn Ser Val Ser Gln Val Glu Thr  
1 5 10 15

Gly Asp Val Val Ser Ala Glu Val Leu Thr Val Asp Ala Thr Gln Ala  
20 25 30

Asn Val Ala Ile Ser Gly Thr Gly Val Glu Gly Val Leu Thr Leu Arg  
35 40 45

Glu Leu Thr Asn Asp Arg Asp Ala Asp Ile Asn Asp Phe Val Lys Val  
50 55 60



Gly Glu Val Leu Asp Val Leu Val Leu Arg Gln Val Val Gly Lys Asp  
 65 70 75 80

Thr Asp Thr Val Thr Tyr Leu Val Ser Lys Lys Arg Leu Glu Ala Arg  
 85 90 95

Lys Ala Trp Asp Lys Leu Val Gly Arg Glu Glu Glu Val Val Thr Val  
 100 105 110

Lys Gly Thr Arg Ala Val Lys Gly Gly Leu Ser Val Glu Phe Glu Gly  
 115 120 125

Val Arg Gly Phe Ile Pro Ala Ser Met Leu Asp Thr Arg Phe Val Arg  
 130 135 140

Asn Ala Glu Arg Phe Val Gly Gln Glu Phe Asp Thr Lys Ile Lys Glu  
 145 150 155 160

Val Asn Ala Lys Glu Asn Arg Phe Ile Leu Ser Arg Arg Glu Val Val  
 165 170 175

Glu Ala Ala Thr Ala Ala Ala Arg Ala Glu Val Phe Gly Lys Leu Ala  
 180 185 190

Val Gly Asp Val Val Thr Gly Lys Val Ala Arg Ile Thr Ser Phe Gly  
 195 200 205

Ala Phe Val Asp Leu Gly Gly Val Asp Gly Leu Val His Leu Thr Glu  
 210 215 220

Leu Ser His Glu Arg Asn Val Ser Pro Lys Ser Val Val Thr Val Gly  
 225 230 235 240

Glu Glu Ile Glu Val Lys Ile Leu Asp Leu Asn Glu Glu Glu Gly Arg  
 245 250 255

Val Ser Leu Ser Leu Lys Ala Thr Val Pro Gly Pro Trp Asp Gly Val  
 260 265 270

Glu Gln Lys Leu Ala Lys Gly Asp Val Val Glu Gly Thr Val Lys Arg  
 275 280 285

Leu Thr Asp Phe Gly Ala Phe Val Glu Val Leu Pro Gly Ile Asp Gly  
 290 295 300

Leu Val His Val Ser Gln Ile Ser His Lys Arg Ile Glu Asn Pro Lys  
 305 310 315 320

Glu Ala Leu Lys Val Gly Gln Glu Val Gln Val Lys Val Leu Glu Val  
 325 330 335

Asn Ala Asp Ala Glu Arg Val Ser Leu Ser Ile Lys Ala Leu Glu Glu  
 340 345 350

Arg Pro Ala Gln Glu Glu Gly Gln Lys Glu Glu Lys Arg Ala Ala Arg  
 355 360 365

Pro Arg Arg Pro Arg Arg Gln Glu Lys Arg Asp Phe Glu Leu Pro Glu  
 370 375 380

Thr Gln Thr Gly Phe Ser Met Ala Asp Leu Phe Gly Asp Ile Glu Leu  
 385 390 395 400

<210> 652

<211> 470

<212> PRT

<213> Streptococcus pneumoniae

<400> 652

Met Ala Glu Glu Arg Val Glu Pro Lys Pro Ile Asp Leu Gly Glu Tyr  
 1 5 10 15

Lys Phe Gly Phe His Asp Asp Val Glu Pro Val Leu Ser Thr Gly Lys  
 20 25 30

Gly Leu Asn Glu Gly Val Ile Arg Glu Leu Ser Ala Ala Lys Gly Glu  
 35 40 45

Pro Glu Trp Met Leu Glu Phe Arg Leu Lys Ser Tyr Glu Thr Phe Lys  
 50 55 60

Lys Met Pro Met Gln Thr Trp Gly Ala Asp Leu Ser Glu Ile Asp Phe  
 65 70 75 80

Asp Asp Leu Ile Tyr Tyr Gln Lys Pro Ser Asp Lys Pro Ala Arg Ser  
 85 90 95

Trp Asp Asp Val Pro Glu Lys Ile Lys Glu Thr Phe Glu Arg Ile Gly  
 100 105 110

Ile Pro Glu Ala Glu Arg Ala Tyr Leu Ala Gly Ala Ser Ala Gln Tyr  
 115 120 125

Glu Ser Glu Val Val Tyr His Asn Met Lys Glu Glu Phe Gln Lys Leu  
 130 135 140

Gly Ile Ile Phe Thr Asp Thr Asp Ser Ala Leu Lys Glu Tyr Pro Asp  
 145 150 155 160

Leu Phe Lys Gln Tyr Phe Ala Lys Leu Val Pro Pro Thr Asp Asn Lys  
 165 170 175

Leu Ala Ala Leu Asn Ser Ala Val Trp Ser Gly Gly Thr Phe Ile Tyr  
 180 185 190

Val Pro Lys Gly Val Lys Val Asp Ile Pro Leu Gln Thr Tyr Phe Arg  
 195 200 205

Ile Asn Asn Glu Asn Ile Gly Gln Phe Glu Arg Thr Leu Ile Ile Val  
 210 215 220

Asp Glu Gly Ala Ser Val Tyr Tyr Val Glu Gly Cys Thr Ala Pro Thr  
 225 230 235 240

Tyr Ser Ser Asn Ser Leu His Ala Ala Ile Val Glu Ile Phe Ala Leu  
 245 250 255

Asp Gly Ala Tyr Met Arg Tyr Thr Thr Ile Gln Asn Trp Ser Asp Asn  
 260 265 270

Val Tyr Asn Leu Val Thr Lys Arg Ala Lys Ala Gln Lys Asp Ala Thr  
 275 280 285

Val Glu Trp Ile Asp Gly Asn Leu Gly Ala Lys Thr Thr Met Lys Tyr  
 290 295 300

Pro Ser Val Tyr Leu Asp Gly Glu Gly Ala Arg Gly Thr Met Leu Ser  
305 310 315 320

Ile Ala Phe Ala Asn Ala Gly Gln His Gln Asp Thr Gly Ala Lys Met  
325 330 335

Ile His Asn Ala Pro His Thr Ser Ser Ser Ile Val Ser Lys Ser Ile  
340 345 350

Ala Lys Gly Gly Gly Lys Val Asp Tyr Arg Gly Gln Val Thr Phe Asn  
355 360 365

Lys Asn Ser Lys Lys Ser Val Ser His Ile Glu Cys Asp Thr Ile Ile  
370 375 380

Met Asp Asp Leu Ser Ala Ser Asp Thr Ile Pro Phe Asn Glu Ile His  
385 390 395 400

Asn Ser Gln Val Ala Leu Glu His Glu Ala Lys Val Ser Lys Ile Ser  
405 410 415

Glu Glu Gln Leu Tyr Tyr Leu Met Ser Arg Gly Leu Ser Glu Ser Glu  
420 425 430

Ala Thr Glu Met Ile Val Met Gly Phe Val Glu Pro Phe Thr Lys Glu  
435 440 445

Leu Pro Met Glu Tyr Ala Val Glu Leu Asn Arg Leu Ile Ser Tyr Glu  
450 455 460

Met Glu Gly Ser Val Gly  
465 470

<210> 653

<211> 413

<212> PRT

<213> Streptococcus pneumoniae

<400> 653

Met Lys Lys Ile Phe Leu Thr Leu Leu Thr Val Ser Leu Leu Gly Gly  
1 5 10 15

Ala Ser Thr Ala Val Ala Gln Asp Phe Thr Ile Ala Ala Lys His Ala  
 20 25 30  
 Ile Ala Val Glu Ala Asn Thr Gly Lys Ile Leu Tyr Glu Lys Asp Ala  
 35 40 45  
 Thr Gln Pro Val Glu Ile Ala Ser Ile Thr Lys Leu Ile Thr Val Tyr  
 50 55 60  
 Leu Val Tyr Glu Ala Leu Glu Asn Gly Ser Ile Thr Leu Ser Thr Pro  
 65 70 75 80  
 Val Asp Ile Ser Asp Tyr Pro Tyr Gln Leu Thr Thr Asn Ser Glu Ala  
 85 90 95  
 Ser Asn Ile Pro Met Glu Ala Arg Asn Tyr Thr Val Glu Glu Leu Leu  
 100 105 110  
 Glu Ala Thr Leu Val Ser Ser Ala Asn Ser Ala Ala Ile Ala Leu Ala  
 115 120 125  
 Glu Lys Ile Ala Gly Ser Glu Lys Asp Phe Val Asp Met Met Arg Ala  
 130 135 140  
 Lys Leu Leu Glu Trp Gly Ile Gln Asp Ala Thr Val Val Asn Thr Thr  
 145 150 155 160  
 Gly Leu Asn Asn Glu Thr Leu Gly Asp Asn Ile Tyr Pro Gly Ser Lys  
 165 170 175  
 Lys Asp Glu Glu Asn Lys Leu Ser Ala Tyr Asp Val Ala Ile Val Ala  
 180 185 190  
 Arg Asn Leu Ile Lys Lys Tyr Pro Gln Val Leu Glu Ile Thr Lys Lys  
 195 200 205  
 Pro Ser Ser Thr Phe Ala Gly Met Thr Ile Thr Ser Thr Asn Tyr Met  
 210 215 220  
 Leu Glu Gly Met Pro Ala Tyr Arg Gly Gly Phe Asp Gly Leu Lys Thr

225						230										235												240
Gly	Thr	Thr	Asp	Lys	Ala	Gly	Glu	Ser	Phe	Val	Gly	Thr	Thr	Val	Glu													
				245					250																			
Lys	Gly	Met	Arg	Val	Ile	Thr	Val	Val	Leu	Asn	Ala	Asp	His	Gln	Asp													
			260					265					270															
Asn	Asn	Pro	Tyr	Ala	Arg	Phe	Thr	Ala	Thr	Ser	Ser	Leu	Met	Asp	Tyr													
		275					280					285																
Ile	Ser	Ser	Thr	Phe	Thr	Leu	Arg	Lys	Ile	Val	Gln	Gln	Gly	Asp	Ala													
	290					295					300																	
Tyr	Gln	Asp	Ser	Lys	Ala	Pro	Val	Gln	Asp	Gly	Lys	Glu	Asp	Thr	Val													
305					310					315																		
Thr	Ala	Val	Ala	Pro	Glu	Asp	Ile	Tyr	Leu	Ile	Glu	Arg	Val	Gly	Asn													
				325					330					335														
Gln	Ser	Ser	Gln	Ser	Val	Gln	Phe	Thr	Pro	Asp	Ser	Lys	Ala	Ile	Pro													
			340					345					350															
Ala	Pro	Leu	Glu	Ala	Gly	Thr	Val	Val	Gly	His	Leu	Thr	Tyr	Glu	Asp													
		355					360					365																
Lys	Asp	Leu	Ile	Gly	Gln	Gly	Tyr	Ile	Thr	Thr	Glu	Arg	Pro	Ser	Phe													
	370					375					380																	
Glu	Met	Val	Ala	Asp	Lys	Lys	Ile	Glu	Lys	Ala	Phe	Phe	Leu	Lys	Val													
385					390					395					400													
Trp	Trp	Asn	Gln	Phe	Val	Arg	Phe	Val	Asn	Glu	Lys	Leu																
			405						410																			
<210>	654																											
<211>	335																											
<212>	PRT																											
<213>	Streptococcus pneumoniae																											
<400>	654																											
Met	Lys	Arg	Ile	Ala	Val	Leu	Thr	Ser	Gly	Gly	Asp	Ala																

1	5	10	15												
Asn	Ala	Ala	Ile	Arg	Ala	Val	Val	Arg	Gln	Ala	Ile	Ser	Glu	Gly	Met
			20					25					30		
Glu	Val	Phe	Gly	Ile	Tyr	Asp	Gly	Tyr	Ala	Gly	Met	Val	Ala	Gly	Glu
	35						40				45				
Ile	His	Pro	Leu	Asp	Ala	Ala	Ser	Val	Gly	Asp	Ile	Ile	Ser	Arg	Gly
	50					55					60				
Gly	Thr	Phe	Leu	His	Ser	Ala	Arg	Tyr	Pro	Glu	Phe	Ala	Gln	Leu	Glu
65					70					75					80
Gly	Gln	Leu	Lys	Gly	Ile	Glu	Gln	Leu	Lys	Lys	His	Gly	Ile	Glu	Gly
				85					90					95	
Val	Val	Val	Ile	Gly	Gly	Asp	Gly	Ser	Tyr	His	Gly	Ala	Met	Arg	Leu
			100					105						110	
Thr	Glu	His	Gly	Phe	Pro	Ala	Ile	Gly	Leu	Pro	Gly	Thr	Ile	Asp	Asn
		115					120					125			
Asp	Ile	Val	Gly	Thr	Asp	Phe	Thr	Ile	Gly	Phe	Asp	Thr	Ala	Val	Thr
	130					135					140				
Thr	Ala	Met	Asp	Ala	Ile	Asp	Lys	Ile	Arg	Asp	Thr	Ser	Ser	Ser	His
145					150					155					160
Arg	Arg	Thr	Phe	Val	Ile	Glu	Val	Met	Gly	Arg	Asn	Ala	Gly	Asp	Ile
				165					170					175	
Ala	Leu	Trp	Ala	Gly	Ile	Ala	Thr	Gly	Ala	Asp	Glu	Ile	Ile	Ile	Pro
			180					185					190		
Glu	Ala	Gly	Phe	Lys	Met	Glu	Asp	Ile	Val	Ala	Ser	Ile	Lys	Ala	Gly
		195					200					205			
Tyr	Glu	Cys	Gly	Lys	Lys	His	Asn	Ile	Ile	Val	Leu	Ala	Glu	Gly	Val
	210					215					220				

Met Ser Ala Ala Glu Phe Gly Gln Lys Leu Lys Glu Ala Gly Asp Thr  
 225 230 235 240

Ser Asp Leu Arg Val Thr Glu Leu Gly His Ile Gln Arg Gly Gly Ser  
 245 250 255

Pro Thr Ala Arg Asp Arg Val Leu Ala Ser Arg Met Gly Ala His Ala  
 260 265 270

Val Lys Leu Leu Lys Glu Gly Ile Gly Gly Val Ala Val Gly Ile Arg  
 275 280 285

Asn Glu Lys Met Val Glu Asn Pro Ile Leu Gly Thr Ala Glu Glu Gly  
 290 295 300

Ala Leu Phe Ser Leu Thr Ala Glu Gly Lys Ile Val Val Asn Asn Pro  
 305 310 315 320

His Lys Ala Asp Ile Glu Leu Ser Ser Leu Asn Lys Ser Leu Ser  
 325 330 335

<210> 655

<211> 501

<212> PRT

<213> Streptococcus pneumoniae

<400> 655

Met Asn Lys Arg Val Lys Ile Val Ala Thr Leu Gly Pro Ala Val Glu  
 1 5 10 15

Ile Arg Gly Gly Lys Lys Phe Gly Glu Asp Gly Tyr Trp Gly Glu Lys  
 20 25 30

Leu Asp Val Glu Ala Ser Ala Lys Asn Ile Ala Lys Leu Ile Glu Ala  
 35 40 45

Gly Ala Asn Thr Phe Arg Phe Asn Phe Ser His Gly Asp His Gln Glu  
 50 55 60

Gln Gly Glu Arg Met Ala Thr Val Lys Leu Ala Glu Lys Ile Ala Gly  
 65 70 75 80



Lys Lys Val Gly Phe Leu Leu Asp Thr Lys Gly Pro Glu Ile Arg Thr  
 85 90 95  
 Glu Leu Phe Glu Gly Glu Ala Lys Glu Tyr Ser Tyr Lys Thr Gly Glu  
 100 105 110  
 Lys Ile Arg Val Ala Thr Lys Gln Gly Ile Lys Ser Thr Arg Glu Val  
 115 120 125  
 Ile Ala Leu Asn Val Ala Gly Ala Leu Asp Ile Tyr Asp Asp Val Glu  
 130 135 140  
 Val Gly Arg Gln Val Leu Val Asp Asp Gly Lys Leu Gly Leu Arg Val  
 145 150 155 160  
 Val Ala Lys Asp Asp Ala Thr Arg Glu Phe Glu Val Glu Val Glu Asn  
 165 170 175  
 Asp Gly Ile Ile Ala Lys Gln Lys Gly Val Asn Ile Pro Asn Thr Lys  
 180 185 190  
 Ile Pro Phe Pro Ala Leu Ala Glu Arg Asp Asn Asp Asp Ile Arg Phe  
 195 200 205  
 Gly Leu Glu Gln Gly Ile Asn Phe Ile Ala Ile Ser Phe Val Arg Thr  
 210 215 220  
 Ala Lys Asp Val Asn Glu Val Arg Ala Ile Cys Glu Glu Thr Gly Asn  
 225 230 235 240  
 Gly His Val Gln Leu Phe Ala Lys Ile Glu Asn Gln Gln Gly Ile Asp  
 245 250 255  
 Asn Leu Asp Glu Ile Ile Glu Ala Ala Asp Gly Ile Met Ile Ala Arg  
 260 265 270  
 Gly Asp Met Gly Ile Glu Val Pro Phe Glu Met Val Pro Val Tyr Gln  
 275 280 285  
 Lys Met Ile Ile Lys Lys Val Asn Ala Ala Gly Lys Val Val Ile Thr  
 290 295 300

Ala Thr Asn Met Leu Glu Thr Met Thr Glu Lys Pro Arg Ala Thr Arg  
 305 310 315 320

Ser Glu Val Ser Asp Val Phe Asn Ala Val Ile Asp Gly Thr Asp Ala  
 325 330 335

Thr Met Leu Ser Gly Glu Ser Ala Asn Gly Lys Tyr Pro Leu Glu Ser  
 340 345 350

Val Thr Thr Met Ala Thr Ile Asp Lys Asn Ala Gln Ala Leu Leu Asn  
 355 360 365

Glu Tyr Gly Arg Leu Asp Ser Asp Ser Phe Glu Arg Asn Ser Lys Thr  
 370 375 380

Glu Val Met Ala Ser Ala Val Lys Asp Ala Thr Ser Ser Met Asp Ile  
 385 390 395 400

Lys Leu Val Val Thr Leu Thr Lys Thr Gly His Thr Ala Arg Leu Ile  
 405 410 415

Ser Lys Tyr Arg Pro Asn Ala Asp Ile Leu Ala Leu Thr Phe Asp Glu  
 420 425 430

Leu Thr Glu Arg Gly Leu Met Leu Asn Trp Gly Val Ile Pro Met Leu  
 435 440 445

Thr Asp Ala Pro Ser Ser Thr Asp Asp Met Phe Glu Ile Ala Glu Arg  
 450 455 460

Lys Ala Val Glu Ala Gly Leu Val Glu Ser Gly Asp Asp Ile Val Ile  
 465 470 475 480

Val Ala Gly Val Pro Val Gly Glu Ala Val Arg Thr Asn Thr Met Arg  
 485 490 495

Ile Arg Thr Val Arg  
 500

<210> 656

<211> 491

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 656

Met Lys Glu Leu Asp Gln Asn Gln Ala Pro Ile Tyr Glu Ala Leu Val  
 1 5 10 15

Lys Leu Arg Lys Lys Arg Ile Val Pro Phe Asp Val Pro Gly His Lys  
 20 25 30

Arg Gly Arg Gly Asn Pro Glu Leu Val Glu Leu Leu Gly Glu Lys Cys  
 35 40 45

Val Gly Ile Asp Val Asn Ser Met Lys Pro Leu Asp Asn Leu Gly His  
 50 55 60

Pro Ile Ser Ile Ile Arg Asp Ala Glu Glu Leu Ala Ala Asp Ala Phe  
 65 70 75 80

Gly Ala Ser His Ala Phe Leu Met Ile Gly Gly Thr Thr Ser Ser Val  
 85 90 95

Gln Thr Met Ile Leu Ala Thr Cys Lys Ala Gly Asp Lys Ile Ile Leu  
 100 105 110

Pro Arg Asn Val His Lys Ser Ala Ile Asn Ala Leu Val Leu Cys Gly  
 115 120 125

Ala Ile Pro Ile Tyr Ile Glu Met Ser Val Asp Pro Lys Ile Gly Ile  
 130 135 140

Ala Leu Gly Leu Glu Asn Asp Arg Val Ala Gln Ala Ile Lys Asp His  
 145 150 155 160

Pro Asp Ala Lys Ala Ile Leu Ile Asn Asn Pro Thr Tyr Tyr Gly Ile  
 165 170 175

Cys Ser Asp Leu Lys Gly Leu Thr Glu Met Ala His Glu Ala Gly Met  
 180 185 190

Met Val Leu Val Asp Glu Ala His Gly Ala His Leu His Phe Thr Asp  
 195 200 205

Lys Leu Pro Ile Ser Ala Met Asp Ala Gly Ala Asp Met Ala Ala Val  
 210 215 220

Ser Met His Lys Ser Gly Gly Ser Leu Thr Gln Ser Ser Ile Leu Leu  
 225 230 235 240

Ile Gly Glu Gln Met Asn Ser Glu Tyr Val Arg Gln Ile Ile Asn Leu  
 245 250 255

Thr Gln Ser Thr Ser Ala Ser Tyr Leu Leu Met Ala Ser Leu Asp Ile  
 260 265 270

Ser Arg Arg Asn Leu Ala Leu Arg Gly Lys Glu Ser Phe Glu Lys Val  
 275 280 285

Ile Glu Leu Ser Glu Tyr Ala Arg Arg Glu Ile Asn Ala Ile Gly Gly  
 290 295 300

Tyr Tyr Ala Tyr Ser Lys Glu Leu Ile Asp Gly Val Ser Val Cys Asp  
 305 310 315 320

Phe Asp Val Thr Lys Leu Ser Val Tyr Thr Gln Gly Ile Gly Leu Thr  
 325 330 335

Gly Ile Glu Val Tyr Asp Leu Leu Arg Asp Glu Tyr Asp Ile Gln Ile  
 340 345 350

Glu Phe Gly Asp Ile Gly Asn Ile Leu Ala Tyr Ile Ser Ile Gly Asp  
 355 360 365

Arg Ile Gln Asp Ile Glu Arg Leu Val Gly Ala Leu Ala Asp Ile Lys  
 370 375 380

Arg Leu Tyr Ser Arg Asp Gly Lys Asp Leu Ile Ala Gly Glu Tyr Ile  
 385 390 395 400

Gln Pro Glu Leu Val Leu Ser Pro Gln Glu Ala Phe Tyr Ser Glu Arg  
 405 410 415

Lys Ser Leu Thr Leu Asp Asp Ser Val Gly Gln Val Cys Gly Glu Phe

420                                      425                                      430  
 Val Met Cys Tyr Pro Pro Gly Ile Pro Ile Leu Ala Pro Gly Glu Arg  
                     435                                      440                                      445  
 Ile Thr Arg Glu Ile Val Asp Tyr Ile Gln Phe Ala Lys Glu Arg Gly  
                     450                                      455                                      460  
 Cys Ser Leu Gln Gly Thr Glu Asp Pro Glu Val Asn His Ile Asn Val  
                     465                                      470                                      475                                      480  
 Ile Lys Arg Lys Thr Asn Tyr Lys Lys Ser Gln  
                                     485                                      490  
  
 <210> 657  
 <211> 286  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 657  
  
 Met Asp Leu Trp Phe Ser Glu Val His Thr Pro Asp Val Lys Leu Ser  
 1                                      5                                      10                                      15  
  
 Leu Arg Thr Ala Lys Gln Leu Tyr Ala Gly Lys Ser Glu Trp Gln Asp  
                     20                                      25                                      30  
  
 Ile Glu Val Leu Asp Thr Pro Ala Phe Gly Lys Ile Leu Ile Leu Asn  
                     35                                      40                                      45  
  
 Gly His Val Leu Phe Ser Asp Ala Asp Asp Phe Val Tyr Asn Glu Met  
                     50                                      55                                      60  
  
 Thr Val His Val Pro Met Ala Val His Pro Asn Pro Lys Lys Val Leu  
 65                                      70                                      75                                      80  
  
 Val Ile Gly Gly Gly Asp Gly Gly Val Ala Gln Val Leu Thr Leu Tyr  
                                     85                                      90                                      95  
  
 Pro Glu Leu Glu Gln Ile Asp Ile Val Glu Pro Asp Glu Met Leu Val  
                     100                                      105                                      110  
  
 Glu Val Cys Arg Glu Tyr Phe Pro Asp Phe Ala Ala Gly Leu Asp Asp

115                                      120                                      125  
 Pro Arg Val Thr Ile Tyr Tyr Gln Asn Gly Leu Arg Phe Leu Arg Asn  
     130                                      135                                      140  
  
 Cys Glu Asp Asp Tyr Asp Ile Ile Ile Asn Asp Ala Thr Asp Pro Phe  
     145                                      150                                      155                                      160  
  
 Gly His Thr Glu Gly Leu Phe Thr Lys Glu Phe Tyr Gly Asn Ser Tyr  
                                     165                                      170                                      175  
  
 Arg Ala Leu Lys Glu Asp Gly Ile Met Ile Tyr Gln His Gly Ser Pro  
                                     180                                      185                                      190  
  
 Phe Phe Asp Glu Asp Glu Ser Ala Cys Arg Ser Met His Arg Lys Val  
                                     195                                      200                                      205  
  
 Asn Gln Ala Phe Pro Ile Ser Arg Val Tyr Gln Ala His Ile Pro Thr  
     210                                      215                                      220  
  
 Ser Pro Ala Gly Tyr Trp Leu Phe Gly Phe Ala Ser Lys Lys Tyr His  
     225                                      230                                      235                                      240  
  
 Pro Val Lys Asp Phe Asp Lys Glu Gly Trp Lys Lys Arg Gln Leu Phe  
                                     245                                      250                                      255  
  
 Thr Glu Tyr Tyr Thr Ala Asn Leu His Val Gly Ala Phe Met Leu Pro  
                                     260                                      265                                      270  
  
 Lys Tyr Val Glu Asp Ile Leu Glu Glu Glu Gly Lys Lys  
                                     275                                      280                                      285  
  
 <210> 658  
 <211> 291  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 658  
  
 Met Arg Asn Val Arg Val Ala Thr Ile Gln Met Gln Cys Ala Lys Asp  
     1                                      5                                      10                                      15  
  
 Val Ala Thr Asn Ile Gln Thr Ala Glu Arg Leu Val Arg Gln Ala Ala

20	25	30
Glu Gln Gly Ala Gln Ile Ile Leu Leu Pro Glu Leu Phe Glu His Pro		
35	40	45
Tyr Phe Cys Gln Glu Arg Gln Tyr Asp Tyr Tyr Gln Tyr Ala Gln Ser		
50	55	60
Val Ala Glu Asn Thr Ala Ile Gln His Phe Lys Val Ile Ala Lys Glu		
65	70	75
Leu Gln Val Val Leu Pro Ile Ser Phe Tyr Glu Lys Asp Gly Asn Val		
85	90	95
Leu Tyr Asn Ser Ile Ala Val Ile Asp Ala Asp Gly Glu Val Leu Gly		
100	105	110
Val Tyr Arg Lys Thr His Ile Pro Asp Asp His Tyr Tyr Gln Glu Lys		
115	120	125
Phe Tyr Phe Thr Pro Gly Asn Thr Gly Phe Lys Val Trp Asn Thr Arg		
130	135	140
Tyr Ala Lys Ile Gly Ile Gly Ile Cys Trp Asp Gln Trp Phe Pro Glu		
145	150	155
Thr Ala Arg Cys Leu Ala Leu Asn Gly Ala Glu Leu Leu Phe Tyr Pro		
165	170	175
Thr Ala Ile Gly Ser Glu Pro Ile Leu Asp Thr Asp Ser Cys Gly His		
180	185	190
Trp Gln Arg Thr Met Gln Gly His Ala Ala Ala Asn Ile Val Pro Val		
195	200	205
Ile Ala Ala Asn Arg Tyr Gly Leu Glu Glu Val Thr Pro Ser Glu Glu		
210	215	220
Asn Gly Gly Gln Ser Ser Ser Leu Asp Phe Tyr Gly Ser Ser Phe Met		
225	230	235
		240





<210> 660  
 <211> 181  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 660

Met Glu Phe Glu Glu Lys Thr Leu Ser Arg Lys Glu Ile Tyr Gln Gly  
 1 5 10 15

Pro Ile Phe Lys Leu Val Gln Asp Gln Val Glu Leu Pro Glu Gly Lys  
 20 25 30

Gly Thr Ala Gln Arg Asp Leu Ile Phe His Asn Gly Ala Val Cys Val  
 35 40 45

Leu Ala Val Thr Asp Glu Gln Lys Leu Ile Leu Val Lys Gln Tyr Arg  
 50 55 60

Lys Ala Ile Glu Ala Val Ser Tyr Glu Ile Pro Ala Gly Lys Leu Glu  
 65 70 75 80

Val Gly Glu Asn Thr Ala Pro Val Ala Ala Ala Leu Arg Glu Leu Glu  
 85 90 95

Glu Glu Thr Ala Tyr Thr Gly Lys Leu Glu Leu Leu Tyr Asp Phe Tyr  
 100 105 110

Ser Ala Ile Gly Phe Cys Asn Glu Lys Leu Lys Leu Tyr Leu Ala Ser  
 115 120 125

Asp Leu Thr Lys Val Glu Asn Pro Arg Pro Gln Asp Glu Asp Glu Thr  
 130 135 140

Leu Glu Val Leu Glu Val Ser Leu Glu Glu Ala Lys Glu Leu Ile Gln  
 145 150 155 160

Ser Gly His Ile Cys Asp Ala Lys Thr Ile Met Ala Val Gln Tyr Trp  
 165 170 175

Glu Leu Gln Lys Lys  
 180

&lt;210&gt; 661

&lt;211&gt; 191

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 661

Met Asn Lys Gly Gly Gln Met Lys Lys Val Met Phe Ala Gly Leu Ser  
 1 5 10 15

Leu Leu Ser Leu Val Val Leu Met Ala Cys Gly Glu Glu Glu Thr Lys  
 20 25 30

Lys Thr Gln Ala Ala Gln Gln Pro Lys Gln Gln Thr Thr Val Gln Gln  
 35 40 45

Ile Ala Val Gly Lys Asp Ala Pro Asp Phe Thr Leu Gln Ser Met Asp  
 50 55 60

Gly Lys Glu Val Lys Leu Ser Asp Phe Lys Gly Lys Lys Val Tyr Leu  
 65 70 75 80

Lys Phe Trp Ala Ser Trp Cys Gly Pro Cys Lys Lys Ser Met Pro Glu  
 85 90 95

Leu Met Glu Leu Ala Ala Lys Pro Asp Arg Asp Phe Glu Ile Leu Thr  
 100 105 110

Val Ile Ala Pro Gly Ile Gln Gly Glu Lys Thr Val Glu Gln Phe Pro  
 115 120 125

Gln Trp Phe Gln Glu Gln Gly Tyr Lys Asp Ile Pro Val Leu Tyr Asp  
 130 135 140

Thr Lys Ala Thr Thr Phe Gln Ala Tyr Gln Ile Arg Ser Ile Pro Thr  
 145 150 155 160

Glu Tyr Leu Ile Asp Ser Gln Gly Lys Ile Gly Lys Ile Gln Phe Gly  
 165 170 175

Ala Ile Ser Asn Ala Asp Ala Glu Ala Ala Phe Lys Glu Met Asn  
 180 185 190

<210> 662  
 <211> 418  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 662

Met Ile Phe Asp Lys Asp Asp Phe Lys Ala Tyr Asp Ala Asp Leu Trp  
 1 5 10 15

Asn Ala Ile Ala Lys Glu Glu Glu Arg Gln Gln Asn Asn Ile Glu Leu  
 20 25 30

Ile Ala Ser Glu Asn Val Val Ser Lys Ala Val Met Ala Ala Gln Gly  
 35 40 45

Ser Ile Leu Thr Asn Lys Tyr Ala Glu Gly Tyr Pro Gly Arg Arg Tyr  
 50 55 60

Tyr Gly Gly Thr Asp Val Val Asp Val Val Glu Thr Leu Ala Ile Glu  
 65 70 75 80

Arg Ala Lys Glu Ile Phe Gly Ala Lys Phe Ala Asn Val Gln Pro His  
 85 90 95

Ser Gly Ser Gln Ala Asn Cys Ala Ala Tyr Met Ser Leu Ile Glu Pro  
 100 105 110

Gly Asp Thr Val Met Gly Met Asp Leu Ala Ser Gly Gly His Leu Thr  
 115 120 125

His Gly Ala Pro Val Ser Phe Ser Gly Gln Thr Tyr Asn Phe Val Ser  
 130 135 140

Tyr Ser Val Asp Pro Lys Thr Glu Leu Leu Asp Phe Asp Ala Ile Leu  
 145 150 155 160

Lys Gln Ala Gln Glu Val Lys Pro Lys Leu Ile Val Ala Gly Ala Ser  
 165 170 175

Ala Tyr Ser Gln Ile Ile Asp Phe Ser Lys Phe Arg Glu Ile Ala Asp  
 180 185 190

Ala Val Gly Ala Lys Leu Met Val Asp Met Ala His Ile Ala Gly Leu  
 195 200 205

Val Ala Ala Gly Leu His Pro Ser Pro Val Pro Tyr Ala His Ile Thr  
 210 215 220

Thr Thr Thr Thr His Lys Thr Leu Arg Gly Pro Arg Gly Gly Leu Ile  
 225 230 235 240

Leu Thr Asn Asp Glu Glu Leu Ala Lys Lys Ile Asn Ser Ala Ile Phe  
 245 250 255

Pro Gly Ile Gln Gly Gly Pro Leu Glu His Val Val Ala Ala Lys Ala  
 260 265 270

Val Ser Phe Lys Glu Val Leu Asp Pro Ala Phe Lys Glu Tyr Ala Ala  
 275 280 285

Asn Val Ile Lys Asn Ser Lys Ala Met Ala Asp Val Phe Leu Gln Asp  
 290 295 300

Pro Asp Phe Arg Ile Ile Ser Gly Gly Thr Glu Asn His Leu Phe Leu  
 305 310 315 320

Val Asp Val Thr Lys Val Val Glu Asn Gly Lys Val Ala Gln Asn Leu  
 325 330 335

Leu Asp Glu Val Asn Ile Thr Leu Asn Lys Asn Ser Ile Pro Tyr Glu  
 340 345 350

Ser Leu Ser Pro Phe Lys Thr Ser Gly Ile Arg Ile Gly Ala Ala Ala  
 355 360 365

Ile Thr Ala Arg Gly Phe Gly Glu Glu Glu Ser Arg Lys Val Ala Glu  
 370 375 380

Leu Ile Ile Lys Thr Leu Lys Asn Ser Glu Asn Glu Ala Val Leu Glu  
 385 390 395 400

Glu Val Arg Ser Ala Val Lys Glu Leu Thr Asp Ala Phe Pro Leu Tyr  
 405 410 415

Glu Asp

<210> 663  
 <211> 341  
 <212> PRT  
 <213> Streptococcus pneumoniae

&lt;400&gt; 663

Met Lys Asn Lys Phe Phe Leu Ile Ala Ile Leu Ala Met Cys Ile Val  
 1 5 10 15

Phe Ser Ala Cys Ser Ser Asn Ser Val Lys Asn Glu Glu Asn Thr Ser  
 20 25 30

Lys Glu His Ala Pro Asp Lys Ile Val Leu Asp His Ala Phe Gly Gln  
 35 40 45

Thr Ile Leu Asp Lys Lys Pro Glu Arg Val Ala Thr Ile Ala Trp Gly  
 50 55 60

Asn His Asp Val Ala Leu Ala Leu Gly Ile Val Pro Val Gly Phe Ser  
 65 70 75 80

Lys Ala Asn Tyr Gly Val Ser Ala Asp Lys Gly Val Leu Pro Trp Thr  
 85 90 95

Glu Glu Lys Ile Lys Glu Leu Asn Gly Lys Ala Asn Leu Phe Asp Asp  
 100 105 110

Leu Asp Gly Leu Asn Phe Glu Ala Ile Ser Asn Ser Lys Pro Asp Val  
 115 120 125

Ile Leu Ala Gly Tyr Ser Gly Ile Thr Lys Glu Asp Tyr Asp Thr Leu  
 130 135 140

Ser Lys Ile Ala Pro Val Ala Ala Tyr Lys Ser Lys Pro Trp Gln Thr  
 145 150 155 160

Leu Trp Arg Asp Met Ile Lys Ile Asp Ser Lys Ala Leu Gly Met Glu  
 165 170 175

Lys Glu Gly Asp Glu Leu Ile Lys Asn Thr Glu Ala Arg Ile Ser Lys  
 180 185 190

Glu Leu Glu Lys His Pro Glu Ile Lys Gly Lys Ile Lys Gly Lys Lys  
 195 200 205

Val Leu Phe Thr Met Ile Asn Ala Ala Asp Thr Ser Lys Phe Trp Ile  
 210 215 220

Tyr Thr Ser Lys Asp Pro Arg Ala Asn Tyr Leu Thr Asp Leu Gly Leu  
 225 230 235 240

Val Phe Pro Glu Ser Leu Lys Glu Phe Glu Ser Glu Asp Ser Phe Ala  
 245 250 255

Lys Glu Ile Ser Ala Glu Glu Ala Asn Lys Ile Asn Asp Ala Asp Val  
 260 265 270

Ile Ile Thr Tyr Gly Asp Asp Lys Thr Leu Glu Ala Leu Gln Lys Asp  
 275 280 285

Pro Leu Leu Gly Lys Ile Asn Ala Ile Lys Asn Gly Ala Val Ala Val  
 290 295 300

Ile Pro Asp Asn Thr Pro Leu Ala Ala Ser Cys Thr Pro Thr Pro Leu  
 305 310 315 320

Ser Ile Asn Tyr Thr Ile Glu Glu Tyr Leu Asn Leu Leu Gly Asn Ala  
 325 330 335

Cys Lys Asn Ala Lys  
 340

<210> 664

<211> 898

<212> PRT

<213> Streptococcus pneumoniae

<400> 664

Met Ser Leu Gln Lys Leu Glu Asn Tyr Ser Asn Lys Ser Val Val Gln  
 1 5 10 15

Glu Glu Val Leu Ile Leu Thr Glu Leu Leu Glu Asp Ile Thr Lys Asn  
 20 25 30

Met Leu Ala Pro Glu Thr Phe Glu Lys Ile Ile Gln Leu Lys Glu Leu  
 35 40 45

Ser Thr Gln Glu Asp Tyr Gln Gly Leu Asn Arg Leu Val Thr Ser Leu  
 50 55 60

Ser Asn Asp Glu Met Val Tyr Ile Ser Arg Tyr Phe Ser Ile Leu Pro  
 65 70 75 80

Leu Leu Ile Asn Ile Ser Glu Asp Val Asp Leu Ala Tyr Glu Ile Asn  
 85 90 95

His Gln Asn Asn Ile Asp Gln Asp Tyr Leu Gly Lys Leu Ser Thr Thr  
 100 105 110

Ile Lys Leu Val Ala Glu Lys Glu Asn Ala Val Glu Ile Leu Glu His  
 115 120 125

Leu Asn Val Val Pro Val Leu Thr Ala His Pro Thr Gln Val Gln Arg  
 130 135 140

Lys Ser Met Leu Asp Leu Thr Asn His Ile His Ser Leu Leu Arg Lys  
 145 150 155 160

Tyr Arg Asp Val Lys Leu Gly Leu Ile Asn Lys Asp Lys Trp Tyr Asn  
 165 170 175

Asp Leu Arg Arg Tyr Ile Glu Ile Ile Met Gln Thr Asp Met Ile Arg  
 180 185 190

Glu Lys Lys Leu Lys Val Thr Asn Glu Ile Thr Asn Ala Met Glu Tyr  
 195 200 205

Tyr Asn Ser Ser Phe Leu Lys Ala Val Pro His Leu Thr Thr Glu Tyr  
 210 215 220

Lys Arg Leu Ala Gln Ala His Gly Leu Asn Leu Lys Gln Ala Lys Pro  
 225 230 235 240

Ile Thr Met Gly Met Trp Ile Gly Gly Asp Arg Asp Gly Asn Pro Phe  
                                   245                                  250                                  255

Val Thr Ala Lys Thr Leu Lys Gln Ser Ala Leu Thr Gln Cys Glu Val  
                                   260                                  265                                  270

Ile Met Asn Tyr Tyr Asp Lys Lys Ile Tyr Gln Leu Tyr Arg Glu Phe  
                                   275                                  280                                  285

Ser Leu Ser Thr Ser Ile Val Asn Val Ser Lys Gln Val Arg Glu Met  
                                   290                                  295                                  300

Ala Arg Gln Ser Lys Asp Asn Ser Ile Tyr Arg Glu Lys Glu Leu Tyr  
                                   305                                  310                                  315                                  320

Arg Arg Ala Leu Phe Asp Ile Gln Ser Lys Ile Gln Ala Thr Lys Thr  
                                   325                                  330                                  335

Tyr Leu Ile Glu Asp Glu Glu Val Gly Thr Arg Tyr Glu Thr Ala Asn  
                                   340                                  345                                  350

Asp Phe Tyr Lys Asp Leu Ile Ala Ile Arg Asp Ser Leu Leu Glu Asn  
                                   355                                  360                                  365

Lys Gly Glu Ser Leu Ile Ser Gly Asp Phe Val Glu Leu Leu Gln Ala  
                                   370                                  375                                  380

Val Glu Ile Phe Gly Phe Tyr Leu Ala Ser Ile Asp Met Arg Gln Asp  
                                   385                                  390                                  395                                  400

Ser Ser Val Tyr Glu Ala Cys Val Ala Glu Leu Leu Lys Ser Ala Gly  
                                   405                                  410                                  415

Ile His Ser Arg Tyr Ser Glu Leu Ser Glu Glu Glu Lys Cys Asp Leu  
                                   420                                  425                                  430

Leu Leu Lys Glu Leu Glu Glu Asp Pro Arg Ile Leu Ser Ala Thr His  
                                   435                                  440                                  445

Ala Glu Lys Ser Glu Leu Leu Ala Lys Glu Leu Ala Ile Phe Lys Thr



450					455					460					
Ala 465	Arg	Val	Leu	Lys	Asp 470	Lys	Leu	Gly	Asp	Asp 475	Val	Ile	Arg	Gln	Thr 480
Ile	Ile	Ser	His	Ala 485	Thr	Ser	Leu	Ser	Asp 490	Met	Leu	Glu	Leu	Ala	Ile 495
Leu	Leu	Lys	Glu 500	Val	Gly	Leu	Val	Asp 505	Thr	Glu	Arg	Ala	Arg	Val	Gln
Ile	Val	Pro 515	Leu	Phe	Glu	Thr	Ile 520	Glu	Asp	Leu	Asp	His 525	Ser	Glu	Glu
Thr	Met 530	Arg	Lys	Tyr	Leu	Ser 535	Leu	Ser	Leu	Ala	Lys 540	Lys	Trp	Ile	Asp
Ser 545	Arg	Asn	Asn	Tyr	Gln 550	Glu	Ile	Met	Leu	Gly 555	Tyr	Ser	Asp	Ser	Asn 560
Lys	Asp	Gly	Gly	Tyr 565	Leu	Ser	Ser	Cys	Trp 570	Thr	Leu	Tyr	Lys	Ala	Gln 575
Gln	Gln	Leu	Thr 580	Ala	Ile	Gly	Asp	Glu 585	Phe	Gly	Val	Lys	Val 590	Thr	Phe
Phe	His 595	Gly	Arg	Gly	Gly	Thr	Val 600	Gly	Arg	Gly	Gly	Gly 605	Pro	Thr	Tyr
Glu 610	Ala	Ile	Thr	Ser	Gln 615	Pro	Leu	Lys	Ser	Ile	Lys 620	Asp	Arg	Ile	Arg
Leu 625	Thr	Glu	Gln	Gly	Glu 630	Val	Ile	Gly	Asn 635	Lys	Tyr	Gly	Asn	Lys	Asp 640
Ala	Ala	Tyr	Tyr	Asn 645	Leu	Glu	Met	Leu	Val 650	Ser	Ala	Ala	Ile	Asn	Arg 655
Met	Ile	Thr	Gln 660	Lys	Lys	Ser	Asp	Thr 665	Asn	Thr	Pro	Asn	Arg 670	Tyr	Glu

Thr Ile Met Asp Gln Val Val Asp Arg Ser Tyr Asp Ile Tyr Arg Asp  
 675 680 685

Leu Val Phe Gly Asn Glu His Phe Tyr Asp Tyr Phe Phe Glu Ser Ser  
 690 695 700

Pro Ile Lys Ala Ile Ser Ser Phe Asn Ile Gly Ser Arg Pro Ala Ala  
 705 710 715 720

Arg Lys Thr Ile Thr Glu Ile Gly Gly Leu Arg Ala Ile Pro Trp Val  
 725 730 735

Phe Ser Trp Ser Gln Ser Arg Val Met Phe Pro Gly Trp Tyr Gly Val  
 740 745 750

Gly Ser Ser Phe Lys Glu Phe Ile Asn Lys Asn Pro Glu Asn Ile Ala  
 755 760 765

Ile Leu Arg Asp Met Tyr Gln Asn Trp Pro Phe Phe Gln Ser Leu Leu  
 770 775 780

Ser Asn Val Asp Met Val Leu Ser Lys Ser Asn Met Asn Ile Ala Phe  
 785 790 795 800

Glu Tyr Ala Lys Leu Cys Glu Asp Glu Gln Val Lys Ala Ile Tyr Glu  
 805 810 815

Thr Ile Leu Asn Glu Trp Gln Val Thr Lys Asn Val Ile Leu Ala Ile  
 820 825 830

Glu Gly His Asp Glu Leu Leu Ala Asp Asn Pro Tyr Leu Lys Ala Ser  
 835 840 845

Leu Asp Tyr Arg Met Pro Tyr Phe Asn Ile Leu Asn Tyr Ile Gln Leu  
 850 855 860

Glu Leu Ile Lys Arg Gln Arg Arg Gly Glu Leu Ser Ser Asp Gln Glu  
 865 870 875 880

Arg Leu Ile His Ile Thr Ile Asn Gly Ile Ala Thr Gly Leu Arg Asn  
 885 890 895

Ser Gly

<210> 665  
 <211> 115  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 665

Met Ala Phe Glu Lys Ile Ile Gln Leu Lys Asn Cys Arg Tyr Asp Tyr  
 1 5 10 15

Thr Leu Ser Pro Ser Val Lys Lys Phe Thr Leu Lys Asp Asn Thr Phe  
 20 25 30

Phe Glu Thr Lys Val Gly Asn Tyr Glu Leu Thr Arg Leu Leu Glu Lys  
 35 40 45

Val Pro Asn Ser Gly Glu Gly Phe Gln Leu Lys Ile Ile Ile Asn Lys  
 50 55 60

Glu Leu Thr Gly Ala Lys Ile Asn Ile Thr Asp Lys Phe Gly Leu Arg  
 65 70 75 80

Leu Val Asp Ile Phe Lys Ser Glu Asp His His Ile His Gln Glu Lys  
 85 90 95

Phe Tyr Phe Leu Met Asp Ser Leu Val Glu Arg Gly Val Phe Thr Lys  
 100 105 110

Ser Glu Arg  
 115

<210> 666  
 <211> 319  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 666

Met Ser Asp Arg Lys Asn Met Lys Leu Phe Ala Leu Asn Ser Asn Gln  
 1 5 10 15

Glu Ile Ala Gln Lys Ile Ala Gln Ala Val Gly Val Pro Leu Gly Lys  
                   20                                  25                                  30

Leu Ser Ser Arg Gln Phe Ser Asp Gly Glu Ile Gln Val Asn Ile Glu  
                   35                                  40                                  45

Glu Ser Val Arg Gly Tyr Asp Val Tyr Ile Ile Gln Ser Thr Ser Phe  
                   50                                  55                                  60

Pro Val Asn Asn His Leu Met Glu Leu Leu Ile Met Val Asp Ala Cys  
                   65                                  70                                  75                                  80

Val Arg Ala Ser Ala His Ser Ile Asn Val Val Leu Pro Tyr Phe Gly  
                                   85                                  90                                  95

Tyr Ala Arg Gln Asp Arg Ile Ala Cys Pro Arg Glu Pro Leu Thr Ala  
                                   100                                  105                                  110

Lys Leu Val Ala Asn Met Leu Val Lys Ala Gly Val Asp Arg Ile Leu  
                   115                                  120                                  125

Thr Leu Asp Leu His Ala Val Gln Val Gln Gly Phe Phe Asp Ile Pro  
                   130                                  135                                  140

Val Asp Asn Leu Phe Thr Val Pro Leu Phe Ala Lys His Tyr Cys Asp  
                   145                                  150                                  155                                  160

Lys Gly Leu Leu Gly Ser Asp Val Val Val Val Ser Pro Lys Asn Ser  
                                   165                                  170                                  175

Gly Val Lys Arg Ala Arg Ser Leu Ala Glu Tyr Leu Asp Ala Pro Ile  
                                   180                                  185                                  190

Ala Ile Ile Asp Tyr Pro Gln Asp Asp Ala Thr Arg Asn Glu Gly Tyr  
                   195                                  200                                  205

Ile Ile Gly Asp Val Glu Gly Lys Lys Ala Ile Leu Ile Asp Asp Ile  
                   210                                  215                                  220

Leu Asn Thr Gly Arg Thr Phe Ser Glu Ala Ser Lys Ile Val Glu Arg  
                   225                                  230                                  235                                  240



Glu Gly Leu Arg Ile Thr Gly Gln Ala Met Glu Gly Gly Gly Phe Glu  
 115 120 125

Ala Thr Ser Lys Asn Lys Leu Ala Val Val Arg Arg Glu Pro Val Gly  
 130 135 140

Ile Val Leu Ala Ile Ala Pro Phe Asn Tyr Pro Val Asn Leu Ser Ala  
 145 150 155 160

Ser Lys Ile Ala Pro Ala Leu Ile Ala Gly Asn Val Val Met Phe Lys  
 165 170 175

Pro Pro Thr Gln Gly Ser Ile Ser Gly Leu Leu Leu Ala Lys Ala Phe  
 180 185 190

Glu Glu Ala Gly Ile Pro Ala Gly Val Phe Asn Thr Ile Thr Gly Arg  
 195 200 205

Gly Ser Glu Ile Gly Asp Tyr Ile Ile Glu His Lys Glu Val Asn Phe  
 210 215 220

Ile Asn Phe Thr Gly Ser Thr Pro Ile Gly Glu Arg Ile Gly Arg Leu  
 225 230 235 240

Ala Gly Met Arg Pro Ile Met Leu Glu Leu Gly Gly Lys Asp Ala Ala  
 245 250 255

Leu Val Leu Glu Asp Ala Asp Leu Glu His Ala Ala Lys Gln Ile Val  
 260 265 270

Ala Gly Ala Phe Ser Tyr Ser Gly Gln Arg Cys Thr Ala Ile Lys Arg  
 275 280 285

Val Ile Val Leu Glu Ser Val Ala Asp Lys Leu Ala Thr Leu Leu Gln  
 290 295 300

Glu Glu Val Ser Lys Leu Thr Val Gly Asp Pro Phe Asp Asn Ala Asp  
 305 310 315 320

Ile Thr Pro Val Ile Asp Asn Ala Ser Ala Asp Phe Ile Trp Gly Leu  
 325 330 335

Ile Glu Asp Ala Gln Glu Lys Glu Ala Gln Ala Leu Thr Pro Ile Lys  
 340 345 350

Arg Glu Gly Asn Leu Leu Trp Pro Val Leu Phe Asp Gln Val Thr Lys  
 355 360 365

Asp Met Lys Val Ala Trp Glu Glu Pro Phe Gly Pro Val Leu Pro Ile  
 370 375 380

Ile Arg Val Ala Ser Val Glu Glu Ala Ile Ala Phe Ala Asn Glu Ser  
 385 390 395 400

Glu Phe Gly Leu Gln Ser Ser Val Phe Thr Asn Asp Phe Lys Lys Ala  
 405 410 415

Phe Glu Ile Ala Glu Lys Leu Glu Val Gly Thr Val His Ile Asn Asn  
 420 425 430

Lys Thr Gln Arg Gly Pro Asp Asn Phe Pro Phe Leu Gly Val Lys Gly  
 435 440 445

Ser Gly Ala Gly Val Gln Gly Ile Lys Tyr Ser Ile Glu Ala Met Thr  
 450 455 460

Asn Val Lys Ser Ile Val Phe Asp Val Lys  
 465 470

<210> 668

<211> 326

<212> PRT

<213> Streptococcus pneumoniae

<400> 668

Met Ala Leu Thr Glu Gln Lys Arg Val Arg Leu Glu Lys Leu Ser Asp  
 1 5 10 15

Glu Asn Gly Ile Ile Ser Ala Leu Ala Phe Asp Gln Arg Gly Ala Leu  
 20 25 30

Lys Arg Leu Met Val Lys His Gln Thr Glu Glu Pro Thr Val Ala Gln  
 35 40 45

Met Glu Glu Leu Lys Val Leu Val Ala Asp Glu Leu Thr Lys Tyr Ala  
 50 55 60

Ser Ser Met Leu Leu Asp Pro Glu Tyr Gly Leu Pro Ala Thr Lys Ala  
 65 70 75 80

Leu Asp Glu Lys Ala Gly Leu Leu Leu Ala Tyr Glu Lys Thr Gly Tyr  
 85 90 95

Asp Thr Thr Ser Thr Lys Arg Leu Pro Asp Cys Leu Asp Val Trp Ser  
 100 105 110

Ala Lys Arg Ile Lys Glu Glu Gly Ala Asp Ala Val Lys Phe Leu Leu  
 115 120 125

Tyr Tyr Asp Val Asp Ser Ser Asp Glu Leu Asn Gln Glu Lys Gln Ala  
 130 135 140

Tyr Ile Glu Arg Ile Gly Ser Glu Cys Val Ala Glu Asp Ile Pro Phe  
 145 150 155 160

Phe Leu Glu Ile Leu Ala Tyr Asp Glu Lys Ile Ala Asp Ala Gly Ser  
 165 170 175

Val Glu Tyr Ala Lys Val Lys Pro His Lys Val Ile Gly Ala Met Lys  
 180 185 190

Val Phe Ser Asp Pro Arg Phe Asn Ile Asp Val Leu Lys Val Glu Val  
 195 200 205

Pro Val Asn Ile Lys Tyr Val Glu Gly Phe Ala Glu Gly Glu Val Val  
 210 215 220

Tyr Thr Arg Glu Glu Ala Ala Phe Phe Lys Ala Gln Asp Glu Ala  
 225 230 235 240

Thr Asn Leu Pro Tyr Ile Tyr Leu Ser Ala Gly Val Ser Ala Lys Leu  
 245 250 255

Phe Gln Asp Thr Leu Val Phe Ala His Glu Ser Gly Ala Asn Phe Asn



260	265	270
Gly Val Leu Cys Gly Arg Ala Thr Trp Ala Gly Ser Val Glu Ala Tyr 275 280 285		
Ile Lys Asp Gly Glu Ala Ala Ala Arg Glu Cys Val Arg Thr Thr Gly 290 295 300		
Phe Glu Asn Ile Asp Glu Leu Asn Lys Val Leu Gln Arg Thr Ala Thr 305 310 315 320		
Ser Trp Lys Glu Arg Val 325		
<210> 669		
<211> 171		
<212> PRT		
<213> Streptococcus pneumoniae		
<400> 669		
Met Arg Ile Ala Ile Gly Cys Asp His Ile Val Thr Asp Glu Lys Met 1 5 10 15		
Ala Val Ser Glu Phe Leu Lys Ser Lys Gly Tyr Glu Val Ile Asp Phe 20 25 30		
Gly Thr Tyr Asp His Thr Arg Thr His Tyr Pro Ile Phe Gly Lys Lys 35 40 45		
Val Gly Glu Ala Val Thr Ser Gly Gln Ala Asp Leu Gly Val Cys Ile 50 55 60		
Cys Gly Thr Gly Val Gly Ile Asn Asn Ala Val Asn Lys Val Pro Gly 65 70 75 80		
Val Arg Ser Ala Leu Val Arg Asp Met Thr Thr Ala Leu Tyr Ala Lys 85 90 95		
Glu Gln Leu Asn Ala Asn Val Ile Gly Phe Gly Gly Lys Ile Thr Gly 100 105 110		
Glu Leu Leu Met Cys Asp Ile Ile Glu Ala Phe Ile His Ala Glu Tyr		

115 120 125

Lys Pro Thr Glu Glu Asn Lys Lys Leu Ile Ala Lys Ile Glu His Val  
130 135 140

Glu Ser His Asn Ala Gln Gln Thr Asp Ala Asn Phe Phe Thr Glu Phe  
145 150 155 160

Leu Glu Lys Trp Asp Arg Gly Glu Tyr His Asp  
165 170

<210> 670  
<211> 141  
<212> PRT  
<213> Streptococcus pneumoniae

<400> 670

Met Ser Ile Val Ile Gly Ala Asp Ala Ala Gly Leu Arg Leu Lys Glu  
1 5 10 15

Val Val Lys Asp Phe Leu Glu Lys Glu Asn Phe His Leu Val Asp Val  
20 25 30

Thr Ala Glu Gly Gln Asp Phe Val Asp Val Thr Leu Ala Val Ala Ala  
35 40 45

Glu Val Asn Lys Glu Glu Gln Asn Leu Gly Ile Val Ile Asp Ala Tyr  
50 55 60

Gly Ala Gly Pro Phe Ile Val Ala Thr Lys Ile Lys Gly Met Val Ala  
65 70 75 80

Ala Glu Val Ser Asp Glu Arg Ser Ala Tyr Met Thr Arg Gly His Asn  
85 90 95

Asn Ser Arg Met Ile Thr Met Gly Ala Gln Leu Val Gly Asp Glu Leu  
100 105 110

Ala Lys Asn Ile Ala Lys Gly Phe Val Asn Gly Lys Tyr Asp Gly Gly  
115 120 125

Arg His Gln Ile Arg Val Asp Met Leu Asn Lys Met Gly

130                                      135                                      140  
  
 <210> 671  
 <211> 628  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 671  
  
 Met Val Leu Ser Lys Tyr Gln Lys Gln Phe Ile Ile Asn Arg Tyr Pro  
 1                                      5                                      10                                      15  
  
 Glu Arg Lys Arg Ile Met Asn Leu Glu Glu Leu Lys Lys Arg Gln Glu  
                                     20                                      25                                      30  
  
 Lys Ile Arg Asn Phe Ser Ile Ile Ala His Ile Asp His Gly Lys Ser  
                                     35                                      40                                      45  
  
 Thr Leu Ala Asp Arg Ile Leu Glu Lys Thr Glu Thr Val Ser Ser Arg  
                                     50                                      55                                      60  
  
 Glu Met Gln Ala Gln Leu Leu Asp Ser Met Glu Leu Glu Arg Glu Arg  
 65                                      70                                      75                                      80  
  
 Gly Ile Thr Ile Lys Leu Asn Ala Ile Glu Leu Asn Tyr Thr Ala Lys  
                                     85                                      90                                      95  
  
 Asp Gly Glu Thr Tyr Ile Phe His Leu Ile Asp Thr Pro Gly His Val  
                                     100                                      105                                      110  
  
 Asp Phe Thr Tyr Glu Val Ser Arg Ser Leu Ala Ala Cys Glu Gly Ala  
                                     115                                      120                                      125  
  
 Ile Leu Val Val Asp Ala Ala Gln Gly Ile Glu Ala Gln Thr Leu Ala  
                                     130                                      135                                      140  
  
 Asn Val Tyr Leu Ala Leu Asp Asn Asp Leu Glu Ile Met Pro Ile Ile  
 145                                      150                                      155                                      160  
  
 Asn Lys Ile Asp Leu Pro Ala Ala Asp Pro Glu Arg Val Arg Thr Glu  
                                     165                                      170                                      175  
  
 Ile Glu Asp Val Ile Gly Leu Asp Ala Ser Glu Ala Val Leu Ala Ser

180	185	190
Ala Lys Ala Gly Ile Gly Ile Glu Glu Ile Leu Glu Gln Ile Val Glu		
195	200	205
Lys Val Pro Ala Pro Thr Gly Asp Val Thr Ala Pro Leu Lys Ala Leu		
210	215	220
Ile Phe Asp Ser Val Tyr Asp Ala Tyr Arg Gly Val Ile Leu Gln Val		
225	230	235
Arg Val Met Asp Gly Val Val Lys Pro Gly Asp Lys Ile Gln Leu Met		
245	250	255
Ser Asn Ser Lys Thr Phe Asp Val Ala Glu Val Gly Ile Phe Thr Pro		
260	265	270
Lys Ala Val Gly Arg Asp Phe Leu Ala Thr Gly Asp Val Gly Tyr Ile		
275	280	285
Ala Ala Ser Ile Lys Thr Val Gln Asp Thr Arg Val Gly Asp Thr Val		
290	295	300
Thr Leu Ala Thr Asn Pro Ala Ala Glu Pro Leu His Gly Tyr Lys Gln		
305	310	315
Met Asn Pro Met Val Phe Ala Gly Leu Tyr Pro Ile Glu Ser Asn Lys		
325	330	335
Tyr Asn Asp Leu Arg Glu Ala Leu Glu Lys Leu Gln Leu Asn Asp Ala		
340	345	350
Ser Leu Gln Phe Glu Pro Glu Thr Ser Gln Ala Leu Gly Phe Gly Phe		
355	360	365
Arg Cys Gly Phe Leu Gly Leu Leu His Met Asp Val Ile Gln Glu Arg		
370	375	380
Leu Glu Arg Glu Phe Asn Ile Asp Leu Ile Met Thr Ala Pro Ser Val		
385	390	395
		400

Ile Tyr Lys Val Asn Leu Thr Asp Gly Glu Ser Met Asp Val Ser Asn  
 405 410 415

Pro Ser Glu Phe Pro Asp Pro Thr Lys Ile Ala Thr Ile Glu Glu Pro  
 420 425 430

Tyr Val Lys Ala Gln Ile Met Val Pro Gln Glu Phe Val Gly Ala Val  
 435 440 445

Met Glu Leu Ala Gln Arg Lys Arg Gly Asp Phe Val Thr Met Asp Tyr  
 450 455 460

Ile Asp Asp Asn Arg Val Asn Val Ile Tyr Gln Ile Pro Leu Ala Glu  
 465 470 475 480

Ile Val Phe Asp Phe Phe Asp Lys Leu Lys Ser Ser Thr Arg Gly Tyr  
 485 490 495

Ala Ser Phe Asp Tyr Glu Leu Ser Glu Tyr Arg Pro Ser Lys Leu Val  
 500 505 510

Lys Met Asp Ile Leu Leu Asn Gly Asp Lys Val Asp Ala Leu Ser Phe  
 515 520 525

Ile Val His Lys Asp Phe Ala Tyr Glu Arg Gly Lys Leu Ile Val Asp  
 530 535 540

Lys Leu Lys Lys Ile Ile Pro Arg Gln Gln Phe Glu Val Pro Ile Gln  
 545 550 555 560

Ala Ala Ile Gly His Lys Ile Val Ala Arg Thr Asp Ile Lys Ala Leu  
 565 570 575

Arg Lys Asn Val Leu Ala Lys Cys Tyr Gly Gly Asp Val Ser Arg Lys  
 580 585 590

Arg Lys Leu Leu Glu Lys Gln Lys Ala Gly Lys Lys Arg Met Lys Ser  
 595 600 605

Ile Gly Ser Val Glu Val Pro Gln Glu Ala Phe Leu Ser Val Leu Ser  
 610 615 620

Met Asp Glu Glu  
625

<210> 672  
<211> 448  
<212> PRT  
<213> Streptococcus pneumoniae

<400> 672

Met Glu Met Glu Lys Tyr Leu Ser Val Thr Thr Leu Thr Lys Tyr Leu  
1 5 10 15

Lys Met Lys Phe Asp Lys Asp Pro Tyr Leu Glu Arg Val Tyr Leu Thr  
20 25 30

Gly Gln Val Ser Asn Phe Arg Lys Arg Pro Thr His Gln Tyr Phe Ser  
35 40 45

Leu Lys Asp Asp His Ala Val Ile Gln Ala Thr Ile Trp Ser Gly Ile  
50 55 60

Tyr Gln Lys Leu Gly Phe Asp Leu Glu Glu Gly Met Lys Ile Asn Val  
65 70 75 80

Ile Gly Arg Val Gln Val Tyr Glu Pro Ser Gly Ser Tyr Ser Ile Ile  
85 90 95

Ile Glu Lys Ala Glu Pro Asp Gly Val Gly Ala Leu Ala Ile Gln Phe  
100 105 110

Glu Gln Leu Lys Lys Lys Leu Thr Glu Glu Gly Leu Phe Gln Glu Arg  
115 120 125

Phe Lys Gln Ala Leu Pro Gln Phe Ser Lys Arg Ile Gly Val Val Thr  
130 135 140

Ser Arg Ser Gly Ala Val Ile Arg Asp Ile Ile Thr Thr Val Ser Arg  
145 150 155 160

Arg Phe Pro Gly Val Asp Ile Leu Leu Tyr Pro Thr Lys Val Gln Gly  
165 170 175

Glu Gly Ala Ala Glu Glu Ile Ala Arg Asn Ile Ala Arg Ala Asn Gln  
 180 185 190

Arg Asp Asp Leu Asp Leu Leu Ile Ile Gly Arg Gly Gly Gly Ser Ile  
 195 200 205

Glu Asp Leu Trp Ala Phe Asn Glu Glu Ile Val Val Arg Ala Ile Phe  
 210 215 220

Glu Ser Arg Leu Pro Val Ile Ser Ser Val Gly His Glu Thr Asp Val  
 225 230 235 240

Thr Leu Ala Asp Phe Val Ala Asp Arg Arg Ala Ala Thr Pro Thr Ala  
 245 250 255

Ala Ala Glu Leu Ala Thr Pro Val Thr Lys Leu Asp Val Leu Ala His  
 260 265 270

Leu Gln Asn Gln Glu Lys Arg Met Val Thr Ala Val Arg Asn Val Leu  
 275 280 285

Ser Lys Lys Gln Glu Ala Leu Lys Lys Cys Ser Gln Ser Val Ile Phe  
 290 295 300

Arg Gln Pro Glu Arg Leu Tyr Asp Gly Tyr Leu Gln Arg Leu Asp Gln  
 305 310 315 320

Leu Gln Leu Arg Leu Lys Gln Ser Leu Arg Thr Arg Ile Ser Asp Asn  
 325 330 335

Lys Gln Leu Val Gln Ala Arg Thr His Gln Leu Val Gln Leu Ser Pro  
 340 345 350

Val Thr Lys Ile Gln Arg Tyr Gln Asp Arg Leu Gly Gln Leu Asp Lys  
 355 360 365

Leu Leu Gly Ser Gln Met Ala Leu Val Tyr Asp Ala Lys Val Ala Glu  
 370 375 380

Ala Lys Arg Leu Ser Glu Ala Leu Leu Met Leu Asp Thr Ser Arg Ile  
 385 390 395 400

Val Ala Arg Gly Tyr Ala Ile Val Lys Lys Glu Glu Ser Val Val Asp  
 405 410 415

Ser Val Glu Ser Leu Lys Lys Lys Asp Gln Val Thr Leu Leu Met Arg  
 420 425 430

Asp Gly Gln Val Glu Leu Glu Val Lys Asp Val Lys Thr Lys Glu Ile  
 435 440 445

<210> 673

<211> 247

<212> PRT

<213> Streptococcus pneumoniae

<400> 673

Met Ser Gln Lys Asn Asn Lys Lys Lys Asn Lys Arg Lys Asn Leu Leu  
 1 5 10 15

Thr Asn Ile Leu Ala Gly Phe Leu Ile Leu Leu Ser Leu Ala Leu Ile  
 20 25 30

Phe Asn Thr Gln Ile Arg Asn Ile Phe Ile Val Trp Asn Thr Asn Lys  
 35 40 45

Tyr Gln Val Ser Gln Val Ser Lys Glu Lys Leu Glu Glu Asn Gln Asp  
 50 55 60

Thr Glu Gly Asn Phe Asp Phe Asp Ser Val Lys Ala Ile Ser Ser Glu  
 65 70 75 80

Ala Val Leu Thr Ser Gln Trp Asp Ala Gln Lys Leu Pro Val Ile Gly  
 85 90 95

Gly Ile Ala Ile Pro Glu Leu Glu Met Asn Leu Pro Ile Phe Lys Gly  
 100 105 110

Leu Asp Asn Val Asn Leu Phe Tyr Gly Ala Gly Thr Met Lys Arg Glu  
 115 120 125

Gln Val Met Gly Glu Gly Asn Tyr Ser Leu Ala Ser His His Ile Phe  
 130 135 140



Gly Val Asp Asn Ala Asn Lys Met Leu Phe Ser Pro Leu Asp Asn Ala  
 145 150 155 160

Lys Asn Gly Met Lys Ile Tyr Leu Thr Asp Lys Asn Lys Val Tyr Thr  
 165 170 175

Tyr Glu Ile Arg Glu Val Lys Arg Val Thr Pro Asp Arg Val Asp Glu  
 180 185 190

Val Asp Asp Arg Asp Gly Val Asn Glu Ile Thr Leu Val Thr Cys Glu  
 195 200 205

Asp Leu Ala Ala Thr Glu Arg Ile Ile Val Lys Gly Asp Leu Lys Glu  
 210 215 220

Thr Lys Asp Tyr Ser Gln Thr Ser Asn Glu Ile Leu Thr Ala Phe Asn  
 225 230 235 240

Gln Pro Tyr Lys Gln Phe Tyr  
 245

<210> 674

<211> 332

<212> PRT

<213> Streptococcus pneumoniae

<400> 674

Met Phe Lys Thr Met Thr Ser Thr Lys Gln His Lys Lys Val Ile Leu  
 1 5 10 15

Val Gly Asp Gly Ala Val Gly Ser Ser Tyr Ala Phe Ala Leu Val Asn  
 20 25 30

Gln Gly Ile Ala Gln Glu Leu Gly Ile Ile Glu Ile Pro Gln Leu His  
 35 40 45

Glu Lys Ala Val Gly Asp Ala Leu Asp Leu Ser His Ala Leu Ala Phe  
 50 55 60

Thr Ser Pro Lys Lys Ile Tyr Ala Ala Gln Tyr Ser Asp Cys Ala Asp  
 65 70 75 80

Ala Asp Leu Val Val Ile Thr Ala Gly Ala Pro Gln Lys Pro Gly Glu  
                             85                            90                            95

Thr Arg Leu Asp Leu Val Gly Lys Asn Leu Ala Ile Asn Lys Ser Ile  
                             100                            105                            110

Val Thr Gln Val Val Glu Ser Gly Phe Lys Gly Ile Phe Leu Val Ala  
                             115                            120                            125

Ala Asn Pro Val Asp Val Leu Thr Tyr Ser Thr Trp Lys Phe Ser Gly  
                             130                            135                            140

Phe Pro Lys Glu Arg Val Ile Gly Ser Gly Thr Ser Leu Asp Ser Ala  
                             145                            150                            155                            160

Arg Phe Arg Gln Ala Leu Ala Glu Lys Leu Asp Val Asp Ala Arg Ser  
                             165                            170                            175

Val His Ala Tyr Ile Met Gly Glu His Gly Asp Ser Glu Phe Ala Val  
                             180                            185                            190

Trp Ser His Ala Asn Ile Ala Gly Val Asn Leu Glu Glu Phe Leu Lys  
                             195                            200                            205

Asp Thr Gln Asn Val Gln Glu Ala Glu Leu Ile Glu Leu Phe Glu Gly  
                             210                            215                            220

Val Arg Asp Ala Ala Tyr Thr Ile Ile Asn Lys Lys Gly Ala Thr Tyr  
                             225                            230                            235                            240

Tyr Gly Ile Ala Val Ala Leu Ala Arg Ile Thr Lys Ala Ile Leu Asp  
                             245                            250                            255

Asp Glu Asn Ala Val Leu Pro Leu Ser Val Phe Gln Glu Gly Gln Tyr  
                             260                            265                            270

Gly Val Glu Asn Val Phe Ile Gly Gln Pro Ala Val Val Gly Ala His  
                             275                            280                            285

Gly Ile Val Arg Pro Val Asn Ile Pro Leu Asn Asp Ala Glu Thr Gln

290                                      295                                      300  
 Lys Met Gln Ala Ser Ala Lys Glu Leu Gln Ala Ile Ile Asp Glu Ala  
 305                                      310                                      315                                      320  
  
 Trp Lys Asn Pro Glu Phe Gln Glu Ala Ser Lys Asn  
                                     325                                      330  
  
 <210> 675  
 <211> 183  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 675  
  
 Met Ala Asn Ile Leu Leu Ala Val Thr Gly Ser Ile Ala Ser Tyr Lys  
 1                                      5                                      10                                      15  
  
 Ser Ala Asp Leu Val Ser Ser Leu Lys Lys Gln Gly His Gln Val Thr  
                                     20                                      25                                      30  
  
 Val Leu Met Thr Gln Ala Ala Thr Glu Phe Ile Gln Pro Leu Thr Leu  
                                     35                                      40                                      45  
  
 Gln Val Leu Ser Gln Asn Pro Val His Leu Asp Val Met Lys Glu Pro  
                                     50                                      55                                      60  
  
 Tyr Pro Asp Gln Val Asn His Ile Glu Leu Gly Lys Lys Ala Asp Leu  
 65                                      70                                      75                                      80  
  
 Phe Ile Val Val Pro Ala Thr Ala Asn Thr Ile Ala Lys Leu Ala His  
                                     85                                      90                                      95  
  
 Gly Phe Ala Asp Asn Met Val Thr Ser Thr Ala Leu Ala Leu Pro Ser  
                                     100                                      105                                      110  
  
 His Ile Pro Lys Leu Ile Ala Pro Ala Met Asn Thr Lys Met Tyr Asp  
                                     115                                      120                                      125  
  
 His Pro Val Thr Gln Asn Asn Leu Lys Thr Leu Glu Thr Tyr Gly Tyr  
                                     130                                      135                                      140  
  
 Gln Leu Ile Ala Pro Lys Glu Ser Leu Leu Ala Cys Gly Asp His Gly

145 150 155 160

Arg Gly Ala Leu Ala Asp Leu Thr Ile Ile Leu Glu Arg Ile Lys Glu  
165 170 175

Thr Ile Asp Glu Lys Thr Leu  
180

<210> 676  
<211> 289  
<212> PRT  
<213> Streptococcus pneumoniae

<400> 676

Met Glu Lys Ile Ile Lys Glu Lys Ile Ser Ser Leu Leu Ser Gln Glu  
1 5 10 15

Glu Glu Val Leu Ser Val Glu Gln Leu Gly Gly Met Thr Asn Gln Asn  
20 25 30

Tyr Leu Ala Lys Thr Thr Asn Lys Gln Tyr Ile Val Lys Phe Phe Gly  
35 40 45

Lys Gly Thr Glu Lys Leu Ile Asn Arg Gln Asp Glu Lys Tyr Asn Leu  
50 55 60

Glu Leu Leu Lys Asp Leu Gly Leu Asp Val Lys Asn Tyr Leu Phe Asp  
65 70 75 80

Ile Glu Ala Gly Ile Lys Val Asn Glu Tyr Ile Glu Ser Ala Ile Thr  
85 90 95

Leu Asp Ser Thr Ser Ile Lys Thr Lys Phe Asp Lys Ile Thr Pro Ile  
100 105 110

Leu Gln Thr Ile His Thr Ser Ala Lys Glu Leu Arg Gly Glu Phe Ala  
115 120 125

Pro Phe Glu Glu Ile Lys Lys Tyr Glu Ser Leu Ile Glu Glu Gln Ile  
130 135 140

Pro Tyr Ala Asn Tyr Glu Ser Val Arg Asn Ala Val Phe Ser Leu Glu

145                      150                      155                      160  
 Lys Arg Leu Ala Asp Leu Gly Val Asp Arg Lys Ser Cys His Ile Asp  
                                  165                      170                      175  
 Leu Val Pro Glu Asn Phe Ile Glu Ser Pro Gln Gly Arg Leu Tyr Leu  
                                  180                      185                      190  
 Ile Asp Trp Glu Tyr Ser Ser Met Asn Asp Pro Met Trp Asp Leu Ala  
                                  195                      200                      205  
 Ala Leu Phe Leu Glu Ser Glu Phe Thr Ser Gln Glu Glu Glu Thr Phe  
                                  210                      215                      220  
 Leu Ser His Tyr Glu Ser Asp Gln Thr Pro Val Ser His Glu Lys Ile  
                                  225                      230                      235                      240  
 Ala Ile Tyr Lys Ile Leu Gln Asp Thr Ile Trp Ser Leu Trp Thr Val  
                                  245                      250                      255  
 Tyr Lys Glu Glu Gln Gly Glu Asp Phe Gly Asp Tyr Gly Val Asn Arg  
                                  260                      265                      270  
 Tyr Gln Arg Ala Ile Lys Gly Leu Ala Ser Tyr Gly Gly Ser Asp Glu  
                                  275                      280                      285

Lys

<210> 677  
 <211> 267  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 677

Met Lys Gln Leu Thr Val Glu Asp Ala Lys Gln Ile Glu Leu Glu Ile  
 1                      5                      10                      15  
 Leu Asp Tyr Ile Asp Thr Leu Cys Lys Lys His Asn Ile Asn Tyr Ile  
                                  20                      25                      30  
 Ile Asn Tyr Gly Thr Leu Ile Gly Ala Val Arg His Glu Gly Phe Ile

35	40	45													
Pro	Trp	Asp	Asp	Asp	Ile	Asp	Leu	Ser	Met	Pro	Arg	Glu	Asp	Tyr	Gln
50					55					60					
Arg	Phe	Ile	Asn	Ile	Phe	Gln	Lys	Glu	Lys	Ser	Lys	Tyr	Lys	Leu	Leu
65				70						75				80	
Ser	Leu	Glu	Thr	Asp	Lys	Asn	Tyr	Phe	Asn	Asn	Phe	Ile	Lys	Ile	Thr
				85					90					95	
Asp	Ser	Thr	Thr	Lys	Ile	Ile	Asp	Thr	Arg	Asn	Thr	Lys	Thr	Tyr	Glu
			100					105					110		
Ser	Gly	Ile	Phe	Ile	Asp	Ile	Phe	Pro	Ile	Asp	Arg	Phe	Asp	Asp	Pro
	115						120					125			
Lys	Val	Ile	Asp	Thr	Cys	Tyr	Lys	Leu	Glu	Ser	Phe	Lys	Leu	Leu	Ser
130						135					140				
Phe	Ser	Lys	His	Lys	Asn	Ile	Val	Tyr	Lys	Asp	Ser	Leu	Leu	Lys	Asp
145					150					155					160
Trp	Ile	Arg	Thr	Ala	Phe	Trp	Leu	Leu	Leu	Arg	Pro	Val	Ser	Pro	Arg
				165						170					175
Tyr	Phe	Ala	Asn	Lys	Ile	Glu	Lys	Glu	Ile	Gln	Lys	Tyr	Ser	Arg	Glu
			180					185					190		
Asn	Gly	Gln	Tyr	Met	Ala	Phe	Ile	Pro	Ser	Lys	Phe	Lys	Glu	Lys	Glu
	195						200					205			
Val	Phe	Pro	Ser	Gly	Thr	Phe	Asp	Lys	Thr	Ile	Asp	Leu	Pro	Phe	Glu
210						215					220				
Asn	Leu	Ser	Leu	Pro	Ala	Pro	Glu	Lys	Phe	Asp	Thr	Ile	Leu	Thr	Gln
225					230					235					240
Phe	Tyr	Gly	Asp	Tyr	Met	Thr	Leu	Pro	Pro	Glu	Glu	Lys	Arg	Phe	Tyr
			245						250					255	

Ser His Glu Phe His Ala Tyr Lys Leu Glu Asp  
                   260                                  265

<210> 678  
 <211> 115  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 678

Met Asn Pro Leu Ile Gln Ser Leu Thr Glu Gly Gln Leu Arg Thr Asp  
 1                  5                                  10                                  15

Ile Pro Ser Phe Arg Pro Gly Asp Thr Val Arg Val His Ala Lys Val  
                   20                                  25                                  30

Val Glu Gly Asn Arg Glu Arg Ile Gln Ile Phe Glu Gly Val Val Ile  
                   35                                  40                                  45

Ala Arg Lys Gly Ala Gly Ile Ser Glu Asn Tyr Thr Val Arg Lys Ile  
                   50                                  55                                  60

Ser Asn Gly Val Gly Val Glu Arg Ile Phe Pro Ile His Thr Pro Arg  
 65                                  70                                  75                                  80

Val Glu Lys Ile Glu Val Val Arg Tyr Gly Lys Val Arg Arg Ala Lys  
                   85                                  90                                  95

Leu Tyr Tyr Leu Arg Ala Leu Gln Gly Lys Ala Ala Arg Ile Lys Glu  
                   100                                  105                                  110

Ile Arg Arg  
                   115

<210> 679  
 <211> 147  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 679

Met Ala Leu Ala Lys Ile Val Phe Ala Ser Met Thr Gly Asn Thr Glu  
 1                  5                                  10                                  15

Glu Ile Ala Asp Ile Val Ala Asp Lys Leu Arg Asp Leu Gly Leu Asp

20 25 30  
 Val Asp Val Asp Glu Cys Thr Thr Val Asp Ala Ser Asp Phe Leu Glu  
 35 40 45  
 Ala Asp Ile Ala Ile Val Ala Thr Tyr Thr Tyr Gly Asp Gly Glu Leu  
 50 55 60  
 Pro Asp Glu Met Met Asp Phe Tyr Glu Asp Leu Ala Asp Leu Asn Leu  
 65 70 75 80  
 Asn Gly Lys Ile Tyr Gly Val Val Gly Ser Gly Asp Thr Phe Tyr Asp  
 85 90 95  
 Glu Phe Cys Lys Ala Val Asp Asp Phe Asp Arg Val Phe Val Ser Thr  
 100 105 110  
 Gly Ala Glu Lys Gly Ser Glu Cys Val Lys Val Asp Leu Ser Ala Glu  
 115 120 125  
 Glu Glu Asp Ile Glu Arg Leu Glu Gln Phe Ala Glu Glu Leu Ala Ala  
 130 135 140  
 Lys Val Gly  
 145  
 <210> 680  
 <211> 127  
 <212> PRT  
 <213> Streptococcus pneumoniae  
 <400> 680  
 Met Glu Glu Ile Thr Met Ala Leu Asn Ile Glu Asn Ile Ile Ala Glu  
 1 5 10 15  
 Ile Lys Glu Ala Ser Ile Leu Glu Leu Asn Asp Leu Val Lys Ala Ile  
 20 25 30  
 Glu Glu Glu Phe Gly Val Thr Ala Ala Ala Pro Val Ala Val Ala Ala  
 35 40 45  
 Ala Asp Ala Ala Asp Ala Gly Ala Ala Lys Asp Ser Phe Asp Val Glu



50                                      55                                      60  
 Leu Thr Ser Ala Gly Asp Lys Lys Val Gly Val Ile Lys Val Val Arg  
 65                                      70                                      75                                      80  
 Glu Ile Thr Gly Leu Gly Leu Lys Glu Ala Lys Glu Leu Val Asp Gly  
                                     85                                      90                                      95  
 Ala Pro Ala Leu Val Lys Glu Gly Val Ala Thr Ala Glu Ala Glu Glu  
                                     100                                      105                                      110  
 Ile Lys Ala Lys Leu Glu Glu Ala Gly Ala Ser Val Thr Leu Lys  
                                     115                                      120                                      125  
  
 <210> 681  
 <211> 170  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 681  
 Met Asn Thr Leu Met Ser Glu Ala Ile Ile Ala Lys Lys Ala Glu Leu  
 1                                      5                                      10                                      15  
 Val Asp Val Val Ala Glu Lys Met Lys Ala Ala Ala Ser Ile Val Val  
                                     20                                      25                                      30  
 Val Asp Ala Arg Gly Leu Thr Val Glu Gln Asp Thr Val Leu Arg Arg  
                                     35                                      40                                      45  
 Glu Leu Arg Gly Ser Glu Val Glu Tyr Lys Val Ile Lys Asn Ser Ile  
                                     50                                      55                                      60  
 Leu Arg Arg Ala Ala Glu Lys Ala Gly Leu Glu Asp Leu Ala Ser Val  
 65                                      70                                      75                                      80  
 Phe Val Gly Pro Ser Ala Val Ala Phe Ser Asn Glu Asp Val Ile Ala  
                                     85                                      90                                      95  
 Pro Ala Lys Ile Leu Asn Asp Phe Ser Lys Asn Ala Glu Ala Leu Glu  
                                     100                                      105                                      110  
 Ile Lys Gly Gly Ala Ile Glu Gly Ala Val Ala Ser Lys Glu Glu Ile

115                                      120                                      125  
 Leu Ala Leu Ala Thr Leu Pro Asn Arg Glu Gly Leu Leu Ser Met Leu  
     130                                      135                                      140  
  
 Leu Ser Val Leu Gln Ala Pro Val Arg Asn Val Ala Leu Ala Val Lys  
     145                                      150                                      155                                      160  
  
 Ala Val Ala Glu Ser Lys Glu Asp Ala Ala  
                                     165                                      170  
  
 <210> 682  
 <211> 596  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 682  
  
 Met Lys Ser Met His Pro Asn Met Glu Arg Arg Thr Arg Met Lys Arg  
     1                                      5                                      10                                      15  
  
 Gln Thr Val Asn Gln Thr Leu Lys Arg Leu Ala Val Asp Leu Ala Ser  
                                     20                                      25                                      30  
  
 His Pro Phe Leu Leu Phe Leu Ala Phe Leu Gly Thr Ile Ala Gln Val  
                                     35                                      40                                      45  
  
 Gly Leu Ser Ile Tyr Leu Pro Ile Leu Ile Gly Gln Val Ile Asp Gln  
     50                                      55                                      60  
  
 Val Leu Val Ala Gly Ser Ser Pro Val Phe Trp Gln Ile Phe Leu Gln  
     65                                      70                                      75                                      80  
  
 Met Leu Leu Val Val Ile Gly Asn Thr Leu Val Gln Trp Ala Asn Pro  
                                     85                                      90                                      95  
  
 Leu Leu Tyr Asn Arg Leu Ile Phe Ser Tyr Thr Arg Asp Leu Arg Glu  
                                     100                                      105                                      110  
  
 Arg Ile Ile His Lys Leu His Arg Leu Pro Ile Ala Phe Val Asp Arg  
     115                                      120                                      125  
  
 Gln Gly Ser Gly Glu Met Val Ser Arg Val Thr Thr Asp Ile Glu Gln

130	135	140													
Leu	Ala	Ala	Gly	Leu	Thr	Met	Ile	Phe	Asn	Gln	Phe	Phe	Ile	Gly	Val
145					150					155					160
Leu	Met	Ile	Leu	Val	Ser	Ile	Leu	Ala	Met	Leu	Gln	Ile	His	Leu	Leu
				165					170					175	
Met	Thr	Leu	Leu	Val	Leu	Leu	Leu	Thr	Pro	Leu	Ser	Met	Val	Ile	Ser
			180					185					190		
Arg	Phe	Ile	Ala	Lys	Lys	Ser	Tyr	His	Leu	Phe	Gln	Lys	Gln	Thr	Glu
		195					200					205			
Thr	Arg	Gly	Ile	Gln	Thr	Gln	Leu	Ile	Glu	Glu	Ser	Leu	Ser	Gln	Gln
	210					215					220				
Thr	Ile	Ile	Gln	Ser	Phe	Asn	Ala	Gln	Thr	Glu	Phe	Ile	Gln	Arg	Leu
225					230					235					240
Arg	Glu	Ala	His	Asp	Asn	Tyr	Ser	Gly	Tyr	Ser	Gln	Ser	Ala	Ile	Phe
			245						250					255	
Tyr	Ser	Ser	Thr	Val	Asn	Pro	Ser	Thr	Arg	Phe	Val	Asn	Ala	Leu	Ile
			260					265					270		
Tyr	Ala	Leu	Leu	Ala	Gly	Val	Gly	Ala	Tyr	Arg	Ile	Met	Met	Gly	Ser
	275						280					285			
Ala	Leu	Thr	Val	Gly	Arg	Leu	Val	Thr	Phe	Leu	Asn	Tyr	Val	Gln	Gln
	290					295					300				
Tyr	Thr	Lys	Pro	Phe	Asn	Asp	Ile	Ser	Ser	Val	Leu	Ala	Glu	Leu	Gln
305					310					315					320
Ser	Ala	Leu	Ala	Cys	Val	Glu	Arg	Ile	Tyr	Gly	Val	Leu	Asp	Ser	Pro
				325					330					335	
Glu	Val	Ala	Glu	Thr	Gly	Lys	Glu	Val	Leu	Thr	Thr	Ser	Asp	Gln	Val
			340					345					350		

Lys Gly Ala Ile Ser Phe Lys His Val Ser Phe Gly Tyr His Pro Glu  
 355 360 365

Lys Ile Leu Ile Lys Asp Leu Ser Ile Asp Ile Pro Ala Gly Ser Lys  
 370 375 380

Val Ala Ile Val Gly Pro Thr Gly Ala Gly Lys Ser Thr Leu Ile Asn  
 385 390 395 400

Leu Leu Met Arg Phe Tyr Pro Ile Ser Ser Gly Asp Ile Leu Leu Asp  
 405 410 415

Gly Gln Ser Ile Tyr Asp Tyr Thr Arg Val Ser Leu Arg Gln Gln Phe  
 420 425 430

Gly Met Val Leu Gln Glu Thr Trp Leu Thr Gln Gly Thr Ile His Asp  
 435 440 445

Asn Ile Ala Phe Gly Asn Pro Glu Ala Ser Arg Glu Gln Val Ile Ala  
 450 455 460

Ala Ala Lys Ala Ala Asn Ala Asp Phe Phe Ile Gln Gln Leu Pro Gln  
 465 470 475 480

Gly Tyr Asp Thr Lys Leu Glu Asn Ala Gly Glu Ser Leu Ser Val Gly  
 485 490 495

Gln Ala Gln Leu Leu Thr Ile Ala Arg Val Phe Leu Ala Ile Pro Lys  
 500 505 510

Ile Leu Ile Leu Asp Glu Ala Thr Ser Ser Ile Asp Thr Arg Thr Glu  
 515 520 525

Val Leu Val Gln Asp Ala Phe Ala Lys Leu Met Lys Gly Arg Thr Ser  
 530 535 540

Phe Ile Ile Ala His Arg Leu Ser Thr Ile Gln Asp Ala Asp Leu Ile  
 545 550 555 560

Leu Val Leu Val Asp Gly Asp Ile Val Glu Tyr Gly Asn His Gln Glu  
 565 570 575

Leu Met Asp Arg Lys Gly Lys Tyr Tyr Gln Met Gln Lys Ala Ala Ala  
                   580                                  585                                  590

Phe Ser Ser Glu  
                   595

<210> 683

<211> 344

<212> PRT

<213> Streptococcus pneumoniae

<400> 683

Met Phe Glu His Tyr Ser Val Ala Asp Leu Phe Ala Asn Leu Tyr Lys  
   1                                  5                                  10                                  15

Lys Arg Lys Ala Asn Ile Leu Ala Leu Ile Ala Leu Phe Ala Leu Ile  
                   20                                  25                                  30

Ala Val Pro Phe Thr Ile Lys Ala Val Arg Asn Lys Asn Thr Val Lys  
                   35                                  40                                  45

Asp Thr Thr Ser Tyr Ser Thr Tyr Leu Ile Tyr Lys Ile Thr Pro Pro  
       50                                  55                                  60

Lys Glu Ser Asp Lys Thr Ile Leu Asn His Gln Ile Gly Gly Tyr Ser  
   65                                  70                                  75                                  80

Asp Phe Tyr Gly Lys Leu Ile Asp Gly Asn Leu Asn Gly Ala Tyr Leu  
                   85                                  90                                  95

Phe Asn Asp Val Glu Pro Ser Glu Leu Lys Lys Ile Ala Ser Glu Leu  
                   100                                  105                                  110

Asp Thr Thr Glu Thr Thr Leu Lys Asn Ser Thr Asn Asp Tyr Trp Trp  
       115                                  120                                  125

Lys Lys Leu Thr Val Tyr Tyr Met Ile Asp Asp Ala Gly Val Gly Val  
       130                                  135                                  140

Lys Ile Leu Thr Ser Ser Lys Asp Ala Asn Asn Leu Leu Glu Lys Lys  
   145                                  150                                  155                                  160

Ile Asp Gly Leu Ile Glu Lys Phe Lys His Ala Tyr Ala Asn Val Lys  
 165 170 175

Ile Glu Lys Leu Glu Thr Ile Asn Ser Lys Glu Leu Asn Ala Asn Gly  
 180 185 190

Glu Thr Ala Leu Gly Leu Asn Val Lys Asn Leu Ile Leu Arg Leu Val  
 195 200 205

Val Ile Gly Val Val Cys Val Ile Leu Val Val Met Gly Asn Val Leu  
 210 215 220

Val Tyr Leu Phe Asn Pro Thr Ile Asn Arg Val Gly Asp Phe Ser Gln  
 225 230 235 240

Tyr Gln Ile Asp Phe Val Thr Glu Ile Thr Thr Ile Ala Asn Leu Ala  
 245 250 255

Asp Val Leu Ser Tyr Lys Asn Thr Gly Gln Glu Leu Thr Ile Val Ser  
 260 265 270

Ser Asn Lys Ala Ile Leu Asp Lys Leu Lys Gln Ser Gln Glu Ala Leu  
 275 280 285

Lys Gly Met His Phe Val Asp Leu Gln Asp Val Ser Ser Leu Leu Glu  
 290 295 300

Arg Asp Thr Val Leu Leu Val Glu Glu Tyr Gly Val Thr Arg Tyr Lys  
 305 310 315 320

Lys Phe Glu Gln Ser Leu Gln Ile Leu Arg Asn Leu Asn Arg Ser Ile  
 325 330 335

Leu Gly Val Ala Thr Phe Lys Leu  
 340

<210> 684

<211> 424

<212> PRT

<213> Streptococcus pneumoniae

<400> 684

Met Ser Lys Glu Asn Pro Leu Ser His His Glu Gln Leu Arg Tyr Asp  
 1 5 10 15  
 Tyr Leu Leu Lys Asn Ile His Tyr Leu Asn Glu Arg Glu Lys Asn Glu  
 20 25 30  
 Phe Ala Tyr Leu Gln Glu Lys Leu Thr Leu Ala Arg Gly Asn Ser Ser  
 35 40 45  
 Ser Ser Leu Glu Gln Glu Arg Glu Glu Gln Val Asp Leu Pro Ser Tyr  
 50 55 60  
 Ala Asn Arg Ser Arg Ser Gln Ser Lys Ser Gln Ala Leu Ser Phe Pro  
 65 70 75 80  
 Pro Lys Lys Lys Arg Arg Lys Leu Arg Leu Lys Arg Ile Phe Met Val  
 85 90 95  
 Ile Phe Ser Leu Leu Val Cys Val Ala Leu Ala Met Val Phe Met Phe  
 100 105 110  
 Leu Arg Gly Tyr Gln Asp Ala Ser Ala Lys Lys Thr Ala Asp Ala Arg  
 115 120 125  
 Ala Ala Gln Val Glu Val Phe Asn Gly Gln Asp Thr Arg Asp Gly Val  
 130 135 140  
 Asn Ile Leu Ile Met Gly Thr Asp Gly Arg Ile Gly Gln Asn Ser Val  
 145 150 155 160  
 Glu Thr Arg Thr Asp Ser Ile Met Val Leu Asn Val Gly Gly Ser Asp  
 165 170 175  
 Lys Lys Met Lys Leu Val Ser Phe Met Arg Asp Asn Leu Val Tyr Ile  
 180 185 190  
 Asp Gly Tyr Ser Gln Val Ile Asn Gly Arg Lys Gln Thr Asp Asn Lys  
 195 200 205  
 Leu Asn Val Ala Tyr Glu Leu Gly Glu Gln Glu Gly Gln Lys Gly Ala  
 210 215 220

Glu Met Val Arg Gln Val Leu Lys Asp Asn Phe Asp Leu Asp Ile Lys  
 225 230 235 240

Tyr Tyr Ala Leu Val Asp Phe Gln Ala Phe Ala Thr Ala Ile Asp Thr  
 245 250 255

Leu Phe Pro Asp Gly Val Thr Ile Asp Ala Gln Phe Ser Thr Leu Asn  
 260 265 270

Gly Arg Pro Leu Thr Glu Ala Thr Val Gly Asp Asp Leu Tyr Ala Thr  
 275 280 285

Glu Thr Glu Ser Pro Thr Gln Thr Ile Lys Val Gly Lys Gln Gln Met  
 290 295 300

Asn Gly Ser Thr Leu Leu Asn Tyr Ala Arg Phe Arg Asp Asp Asp Glu  
 305 310 315 320

Ala Asp Tyr Gly Arg Thr Lys Arg Gln Gln Gln Val Leu Thr Ala Ile  
 325 330 335

Leu Glu Gln Ile Lys Asp Pro Thr Lys Leu Phe Thr Gly Ser Glu Ala  
 340 345 350

Leu Gly Lys Val Phe Ala Met Thr Ser Thr Asn Val Pro Tyr Thr Phe  
 355 360 365

Leu Leu Thr Asn Gly Leu Ser Val Leu Asp Gly Ala Lys Asn Gly Ile  
 370 375 380

Glu Lys Leu Thr Ile Pro Glu Leu Gly Asp Trp Val Asp Ala Tyr Asp  
 385 390 395 400

Val Tyr Gly Gly Leu Gly Leu Leu Val Asp Gln Asn Lys Tyr Gln Thr  
 405 410 415

Lys Leu Ala Gln Met Gly Leu Arg  
 420

<210> 685



&lt;211&gt; 267

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 685

Met Ser Thr Tyr Asn Trp Asp Glu Lys His Ile Leu Thr Phe Pro Glu  
 1 5 10 15

Glu Lys Val Ala Leu Ser Thr Lys Asp Val His Val Tyr Tyr Gly Lys  
 20 25 30

Asn Glu Ser Ile Lys Gly Ile Asp Met Gln Phe Glu Arg Asn Lys Ile  
 35 40 45

Thr Ala Leu Ile Gly Pro Ser Gly Ser Gly Lys Ser Thr Tyr Leu Arg  
 50 55 60

Ser Leu Asn Arg Met Asn Asp Thr Ile Asp Ile Ala Lys Val Thr Gly  
 65 70 75 80

Gln Ile Leu Tyr Arg Gly Ile Asp Val Asn Arg Pro Glu Ile Asn Val  
 85 90 95

Tyr Glu Met Arg Lys His Ile Gly Met Val Phe Gln Arg Pro Asn Pro  
 100 105 110

Phe Ala Lys Ser Ile Tyr Arg Asn Ile Thr Phe Ala His Glu Arg Ala  
 115 120 125

Gly Val Lys Asp Lys Gln Val Leu Asp Glu Ile Val Glu Thr Ser Leu  
 130 135 140

Arg Gln Ala Ala Leu Trp Asp Gln Val Lys Asp Asp Leu His Lys Ser  
 145 150 155 160

Ala Leu Thr Leu Ser Gly Gly Gln Gln Gln Arg Leu Cys Ile Ala Arg  
 165 170 175

Ala Ile Ser Val Lys Pro Asp Ile Leu Leu Met Asp Glu Pro Ala Ser  
 180 185 190

Ala Leu Asp Pro Ile Ala Thr Met Gln Leu Glu Glu Thr Met Phe Glu

195                                      200                                      205  
 Leu Lys Lys Asn Phe Thr Ile Ile Ile Val Thr His Asn Met Gln Gln  
     210                                      215                                      220  
 Ala Ala Arg Ala Ser Asp Tyr Thr Gly Phe Phe Tyr Leu Gly Asp Leu  
     225                                      230                                      235                                      240  
 Ile Glu Tyr Asp Lys Thr Ala Thr Ile Phe Gln Asn Ala Lys Leu Gln  
                                     245                                      250                                      255  
 Ser Thr Asn Asp Tyr Val Ser Gly His Phe Gly  
                                     260                                      265  
  
 <210> 686  
 <211> 459  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 686  
 Met Ser Lys Ile Val Val Val Gly Ala Asn His Ala Gly Thr Ala Cys  
     1                                      5                                      10                                      15  
  
 Ile Asn Thr Met Leu Asp Asn Phe Gly Asn Glu Asn Glu Ile Val Val  
                                     20                                      25                                      30  
  
 Phe Asp Gln Asn Ser Asn Ile Ser Phe Leu Gly Cys Gly Met Ala Leu  
                                     35                                      40                                      45  
  
 Trp Ile Gly Glu Gln Ile Asp Gly Ala Glu Gly Leu Phe Tyr Ser Asp  
     50                                      55                                      60  
  
 Lys Glu Lys Leu Glu Ala Lys Gly Ala Lys Val Tyr Met Asn Ser Pro  
     65                                      70                                      75                                      80  
  
 Val Leu Ser Ile Asp Tyr Asp Asn Lys Val Val Thr Ala Glu Val Glu  
                                     85                                      90                                      95  
  
 Gly Lys Glu His Lys Glu Ser Tyr Glu Lys Leu Ile Phe Ala Thr Gly  
                                     100                                      105                                      110  
  
 Ser Thr Pro Ile Leu Pro Pro Ile Glu Gly Val Glu Ile Val Lys Gly

115	120	125													
Asn Arg Glu Phe Lys Ala Thr Leu Glu Asn Val Gln Phe Val Lys Leu															
130	135	140													
Tyr Gln Asn Ala Glu Glu Val Ile Asn Lys Leu Ser Asp Lys Ser Gln															
145	150	155													160
His Leu Asp Arg Ile Ala Val Val Gly Gly Gly Tyr Ile Gly Val Glu															
	165	170													175
Leu Ala Glu Ala Phe Glu Arg Leu Gly Lys Glu Val Val Leu Val Asp															
	180	185													190
Ile Val Asp Thr Val Leu Asn Gly Tyr Tyr Asp Lys Asp Phe Thr Gln															
	195	200													205
Met Met Ala Lys Asn Leu Glu Asp His Asn Ile Arg Leu Ala Leu Gly															
	210	215													220
Gln Thr Val Lys Ala Ile Glu Gly Asp Gly Lys Val Glu Arg Leu Ile															
	225	230													240
Thr Asp Lys Glu Ser Phe Asp Val Asp Met Val Ile Leu Ala Val Gly															
	245	250													255
Phe Arg Pro Asn Thr Ala Leu Ala Gly Gly Lys Ile Glu Leu Phe Arg															
	260	265													270
Asn Gly Ala Phe Leu Val Asp Lys Lys Gln Glu Thr Ser Ile Pro Asp															
	275	280													285
Val Tyr Ala Val Gly Asp Cys Ala Thr Val Tyr Asp Asn Ala Arg Lys															
	290	295													300
Asp Thr Ser Tyr Ile Ala Leu Ala Ser Asn Ala Val Arg Thr Gly Ile															
	305	310													320
Val Gly Ala Tyr Asn Ala Cys Gly His Glu Leu Glu Gly Ile Gly Val															
	325	330													335

Gln Gly Ser Asn Gly Ile Ser Ile Tyr Gly Leu His Met Val Ser Thr  
                   340                  345                  350

Gly Leu Thr Leu Glu Lys Ala Lys Ala Ala Gly Tyr Asn Ala Thr Glu  
                   355                  360                  365

Thr Gly Phe Asn Asp Leu Gln Lys Pro Glu Phe Met Lys His Asp Asn  
                   370                  375                  380

His Glu Val Ala Ile Lys Ile Val Phe Asp Lys Asp Ser Arg Glu Ile  
                   385                  390                  395                  400

Leu Gly Ala Gln Met Val Ser His Asp Ile Ala Ile Ser Met Gly Ile  
                                   405                  410                  415

His Met Phe Ser Leu Ala Ile Gln Glu His Val Thr Ile Asp Lys Leu  
                   420                  425                  430

Ala Leu Thr Asp Leu Phe Phe Leu Pro His Phe Asn Lys Pro Tyr Asn  
                   435                  440                  445

Tyr Ile Thr Met Ala Ala Leu Thr Ala Glu Lys  
                   450                  455

<210> 687

<211> 404

<212> PRT

<213> Streptococcus pneumoniae

<400> 687

Met Glu Ala Phe Thr Gln Met Ala Lys Glu Lys Tyr Asp Arg Ser Lys  
   1                  5                  10                  15

Pro His Val Asn Ile Gly Thr Ile Gly His Val Asp His Gly Lys Thr  
                   20                  25                  30

Thr Leu Thr Ala Ala Ile Thr Thr Val Leu Ala Arg Arg Leu Pro Ser  
                   35                  40                  45

Ser Val Asn Gln Pro Lys Asp Tyr Ala Ser Ile Asp Ala Ala Pro Glu  
                   50                  55                  60

Glu Arg Glu Arg Gly Ile Thr Ile Asn Thr Ala His Val Glu Tyr Glu  
65 70 75 80

Thr Glu Lys Arg His Tyr Ala His Ile Asp Ala Pro Gly His Ala Asp  
85 90 95

Tyr Val Lys Asn Met Ile Thr Gly Ala Ala Gln Met Asp Gly Ala Ile  
100 105 110

Leu Val Val Ala Ser Thr Asp Gly Pro Met Pro Gln Thr Arg Glu His  
115 120 125

Ile Leu Leu Ser Arg Gln Val Gly Val Lys His Leu Ile Val Phe Met  
130 135 140

Asn Lys Val Asp Leu Val Asp Asp Glu Glu Leu Leu Glu Leu Val Glu  
145 150 155 160

Met Glu Ile Arg Asp Leu Leu Ser Glu Tyr Asp Phe Pro Gly Asp Asp  
165 170 175

Leu Pro Val Ile Gln Gly Ser Ala Leu Lys Ala Leu Glu Gly Asp Ser  
180 185 190

Lys Tyr Glu Asp Ile Val Met Glu Leu Met Asn Thr Val Asp Glu Tyr  
195 200 205

Ile Pro Glu Pro Glu Arg Asp Thr Asp Lys Pro Leu Leu Leu Pro Val  
210 215 220

Glu Asp Val Phe Ser Ile Thr Gly Arg Gly Thr Val Ala Ser Gly Arg  
225 230 235 240

Ile Asp Arg Gly Ile Val Lys Val Asn Asp Glu Ile Glu Ile Val Gly  
245 250 255

Ile Lys Glu Glu Thr Gln Lys Ala Val Val Thr Gly Val Glu Met Phe  
260 265 270

Arg Lys Gln Leu Asp Glu Gly Leu Ala Gly Asp Asn Val Gly Val Leu  
275 280 285

Leu Arg Gly Val Gln Arg Asp Glu Ile Glu Arg Gly Gln Val Ile Ala  
 290 295 300

Lys Pro Gly Ser Ile Asn Pro His Thr Lys Phe Lys Gly Glu Val Tyr  
 305 310 315 320

Ile Leu Thr Lys Glu Glu Gly Gly Arg His Thr Pro Phe Phe Asn Asn  
 325 330 335

Tyr Arg Pro Gln Phe Tyr Phe Arg Thr Thr Asp Val Thr Gly Ser Ile  
 340 345 350

Glu Leu Pro Ala Gly Thr Glu Met Val Met Pro Gly Asp Asn Val Thr  
 355 360 365

Ile Asp Val Glu Leu Ile His Pro Ile Ala Val Glu Gln Gly Thr Thr  
 370 375 380

Phe Ser Ile Arg Glu Gly Gly Arg Thr Val Gly Ser Gly Met Val Thr  
 385 390 395 400

Glu Ile Glu Ala

<210> 688

<211> 289

<212> PRT

<213> Streptococcus pneumoniae

<400> 688

Met Asp Phe Thr Trp Ala Leu Lys Tyr Ala Thr Glu Phe Leu Gly Thr  
 1 5 10 15

Ala Ile Leu Ile Ile Leu Gly Asn Gly Ala Val Ala Asn Val Glu Leu  
 20 25 30

Lys Gly Thr Lys Gly His Gln Ser Gly Trp Ile Val Ile Ala Val Gly  
 35 40 45

Tyr Gly Met Gly Val Met Ile Pro Ala Leu Met Phe Gly Asn Val Ser  
 50 55 60

Gly Asn His Ile Asn Pro Ala Phe Thr Leu Gly Leu Ala Val Ser Gly  
 65 70 75 80  
 Leu Phe Pro Trp Ala Gln Val Val Pro Tyr Ile Ile Ala Gln Val Leu  
 85 90 95  
 Gly Ala Ile Phe Gly Gln Ala Leu Val Val Ala Thr Tyr Arg Pro Phe  
 100 105 110  
 Tyr Leu Lys Thr Glu Asn Pro Asn Asn Ile Leu Gly Thr Phe Ser Thr  
 115 120 125  
 Ile Ser Ser Ile Asp His Gly Thr Lys Glu Ser Arg Tyr Ala Ala Thr  
 130 135 140  
 Val Asn Gly Leu Ile Asn Glu Phe Val Gly Ser Phe Val Leu Phe Phe  
 145 150 155 160  
 Ala Ala Leu Gly Leu Thr Lys Asn Phe Phe Gly Ala Glu Val Leu Gln  
 165 170 175  
 Phe Met Lys Gln Lys Ala Thr Glu Ala Gly Gln Thr Val Asp Phe Ser  
 180 185 190  
 Asp Leu Ala Ile Lys Ala Gln Val Ala Pro His Thr Ala Ser Gly Leu  
 195 200 205  
 Ser Val Ala His Leu Ala Leu Gly Phe Leu Val Met Ala Leu Val Thr  
 210 215 220  
 Ser Leu Gly Gly Pro Thr Gly Pro Ala Leu Asn Pro Ala Arg Asp Leu  
 225 230 235 240  
 Gly Pro Arg Leu Leu His Ala Phe Leu Pro Lys Ser Val Leu Gly Glu  
 245 250 255  
 His Lys Gly Asp Ser Lys Trp Trp Tyr Ser Trp Val Pro Val Val Ala  
 260 265 270  
 Pro Ile Ala Ala Ala Ile Ala Ala Val Ala Val Phe Lys Phe Leu Tyr  
 275 280 285

Leu

&lt;210&gt; 689

&lt;211&gt; 468

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 689

Met Ser Ser Gly Lys Ile Ala Gln Val Ile Gly Pro Val Val Asp Val  
 1 5 10 15

Leu Phe Ala Ala Gly Glu Lys Leu Pro Glu Ile Asn Asn Ala Leu Val  
 20 25 30

Val Tyr Lys Asn Asp Glu Arg Lys Thr Lys Ile Val Leu Glu Val Ala  
 35 40 45

Leu Glu Leu Gly Asp Gly Met Val Arg Thr Ile Ala Met Glu Ser Thr  
 50 55 60

Asp Gly Leu Thr Arg Gly Met Glu Val Leu Asp Thr Gly Arg Pro Ile  
 65 70 75 80

Ser Val Pro Val Gly Lys Glu Thr Leu Gly Arg Val Phe Asn Val Leu  
 85 90 95

Gly Asp Thr Ile Asp Leu Glu Ala Pro Phe Thr Glu Asp Ala Glu Arg  
 100 105 110

Gln Pro Ile His Lys Lys Ala Pro Thr Phe Asp Glu Leu Ser Thr Ser  
 115 120 125

Ser Glu Ile Leu Glu Thr Gly Ile Lys Val Ile Asp Leu Leu Ala Pro  
 130 135 140

Tyr Leu Lys Gly Gly Lys Val Gly Leu Phe Gly Gly Ala Gly Val Gly  
 145 150 155 160

Lys Thr Val Leu Ile Gln Glu Leu Ile His Asn Ile Ala Gln Glu His  
 165 170 175



Gly Gly Ile Ser Val Phe Ala Gly Val Gly Glu Arg Thr Arg Glu Gly  
 180 185 190

Asn Asp Leu Tyr Trp Glu Met Lys Glu Ser Gly Val Ile Glu Lys Thr  
 195 200 205

Ala Met Val Phe Gly Gln Met Asn Glu Pro Pro Gly Ala Arg Met Arg  
 210 215 220

Val Ala Leu Thr Gly Leu Thr Ile Ala Glu Tyr Phe Arg Asp Val Glu  
 225 230 235 240

Gly Gln Asp Val Leu Leu Phe Ile Asp Asn Ile Phe Arg Phe Thr Gln  
 245 250 255

Ala Gly Ser Glu Val Ser Ala Leu Leu Gly Arg Met Pro Ser Ala Val  
 260 265 270

Gly Tyr Gln Pro Thr Leu Ala Thr Glu Met Gly Gln Leu Gln Glu Arg  
 275 280 285

Ile Thr Ser Thr Lys Lys Gly Ser Val Thr Ser Ile Gln Ala Ile Tyr  
 290 295 300

Val Pro Ala Asp Asp Tyr Thr Asp Pro Ala Pro Ala Thr Ala Phe Ala  
 305 310 315 320

His Leu Asp Ser Thr Thr Asn Leu Glu Arg Lys Leu Val Gln Leu Gly  
 325 330 335

Ile Tyr Pro Ala Val Asp Pro Leu Ala Ser Ser Ser Arg Ala Leu Ala  
 340 345 350

Pro Glu Ile Val Gly Glu Glu His Tyr Ala Val Ala Ala Glu Val Lys  
 355 360 365

Arg Val Leu Gln Arg Tyr His Glu Leu Gln Asp Ile Ile Ala Ile Leu  
 370 375 380

Gly Met Asp Glu Leu Ser Asp Glu Glu Lys Thr Leu Val Ala Arg Ala

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385                               390                               395                               400

Arg Arg Ile Gln Phe Phe Leu Ser Gln Asn Phe Asn Val Ala Glu Gln
      405                               410                               415

Phe Thr Gly Gln Pro Gly Ser Tyr Val Pro Val Ala Glu Thr Val Arg
      420                               425                               430

Gly Phe Lys Glu Ile Leu Asp Gly Lys Tyr Asp His Leu Pro Glu Asp
      435                               440                               445

Ala Phe Arg Gly Val Gly Ser Ile Glu Asp Val Ile Ala Lys Ala Glu
      450                               455                               460

Lys Met Gly Phe
465

<210> 690
<211> 292
<212> PRT
<213> Streptococcus pneumoniae

<400> 690

Met Ala Val Ser Leu Asn Asp Ile Lys Thr Lys Ile Ala Ser Thr Lys
1      5      10      15

Asn Thr Ser Gln Ile Thr Asn Ala Met Gln Met Val Ser Ala Ala Lys
      20      25      30

Leu Gly Arg Ser Glu Glu Ala Ala Arg Asn Phe Gln Val Tyr Ala Gln
      35      40      45

Lys Val Arg Lys Leu Leu Thr Asp Ile Leu His Gly Asn Gly Ala Gly
      50      55      60

Ala Ser Thr Asn Pro Met Leu Ile Ser Arg Ser Val Lys Lys Thr Gly
65      70      75      80

Tyr Ile Val Ile Thr Ser Asp Arg Gly Leu Val Gly Gly Tyr Asn Ser
      85      90      95

Ser Ile Leu Lys Ala Val Met Glu Leu Lys Glu Glu Tyr His Pro Asp

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100	105	110
Gly Lys Gly Phe Glu Met Ile Cys Ile Gly Gly Met Gly Ala Asp Phe 115 120 125		
Phe Lys Ala Arg Gly Ile Gln Pro Leu Tyr Glu Leu Arg Gly Leu Ser 130 135 140		
Asp Gln Pro Ser Phe Asp Gln Val Arg Lys Ile Ile Ser Lys Thr Val 145 150 155 160		
Glu Met Tyr Gln Asn Glu Leu Phe Asp Glu Leu Tyr Val Cys Tyr Asn 165 170 175		
His His Val Asn Thr Leu Thr Ser Gln Met Arg Val Glu Gln Met Leu 180 185 190		
Pro Ile Val Asp Leu Asp Pro Asn Glu Ala Asp Glu Glu Tyr Ser Leu 195 200 205		
Thr Phe Glu Leu Glu Thr Ser Arg Glu Glu Ile Leu Glu Gln Leu Leu 210 215 220		
Pro Gln Phe Ala Glu Ser Met Ile Tyr Gly Ala Ile Ile Asp Ala Lys 225 230 235 240		
Thr Ala Glu Asn Ala Ala Gly Met Thr Ala Met Gln Thr Ala Thr Asp 245 250 255		
Asn Ala Lys Lys Val Ile Asn Asp Leu Thr Ile Gln Tyr Asn Arg Ala 260 265 270		
Arg Gln Ala Ala Ile Thr Gln Glu Ile Thr Glu Ile Val Ala Gly Ala 275 280 285		
Ser Ala Leu Glu 290		

<210> 691  
 <211> 501  
 <212> PRT  
 <213> Streptococcus pneumoniae

&lt;400&gt; 691

Met Ala Ile Asn Ala Gln Glu Ile Ser Ala Leu Ile Lys Gln Gln Ile  
 1 5 10 15

Glu Asn Phe Lys Pro Asn Phe Asp Val Thr Glu Thr Gly Val Val Thr  
 20 25 30

Tyr Ile Gly Asp Gly Ile Ala Arg Ala His Gly Leu Glu Asn Val Met  
 35 40 45

Ser Gly Glu Leu Leu Asn Phe Glu Asn Gly Ser Tyr Gly Met Ala Gln  
 50 55 60

Asn Leu Glu Ser Thr Asp Val Gly Ile Ile Ile Leu Gly Asp Phe Thr  
 65 70 75 80

Asp Ile Arg Glu Gly Asp Thr Ile Arg Arg Thr Gly Lys Ile Met Glu  
 85 90 95

Val Pro Val Gly Glu Ser Leu Ile Gly Arg Val Val Asp Pro Leu Gly  
 100 105 110

Arg Pro Val Asp Gly Leu Gly Glu Ile His Thr Asp Lys Thr Arg Pro  
 115 120 125

Val Glu Ala Pro Ala Pro Gly Val Met Gln Arg Lys Ser Val Ser Glu  
 130 135 140

Pro Leu Gln Thr Gly Leu Lys Ala Ile Asp Ala Leu Val Pro Ile Gly  
 145 150 155 160

Arg Gly Gln Arg Glu Leu Ile Ile Gly Asp Arg Gln Thr Gly Lys Thr  
 165 170 175

Thr Ile Ala Ile Asp Thr Ile Leu Asn Gln Lys Asp Gln Asp Met Ile  
 180 185 190

Cys Ile Tyr Val Ala Ile Gly Gln Lys Glu Ser Thr Val Arg Thr Gln  
 195 200 205

Val Glu Thr Leu Arg Gln Tyr Gly Ala Leu Asp Tyr Thr Ile Val Val  
 210 215 220

Thr Ala Ser Ala Ser Gln Pro Ser Pro Leu Leu Phe Leu Ala Pro Tyr  
 225 230 235 240

Ala Gly Val Ala Met Ala Glu Glu Phe Met Tyr Gln Gly Lys His Val  
 245 250 255

Leu Ile Val Tyr Asp Asp Leu Ser Lys Gln Ala Val Ala Tyr Arg Glu  
 260 265 270

Leu Ser Leu Leu Leu Arg Arg Pro Pro Gly Arg Glu Ala Phe Pro Gly  
 275 280 285

Asp Val Phe Tyr Leu His Ser Arg Leu Leu Glu Arg Ser Ala Lys Val  
 290 295 300

Ser Asp Glu Leu Gly Gly Gly Ser Ile Thr Ala Leu Pro Phe Ile Glu  
 305 310 315 320

Thr Gln Ala Gly Asp Ile Ser Ala Tyr Ile Ala Thr Asn Val Ile Ser  
 325 330 335

Ile Thr Asp Gly Gln Ile Phe Leu Gly Asp Gly Leu Phe Asn Ala Gly  
 340 345 350

Ile Arg Pro Ala Ile Asp Ala Gly Ser Ser Val Ser Arg Val Gly Gly  
 355 360 365

Ser Ala Gln Ile Lys Ala Met Lys Lys Val Ala Gly Thr Leu Arg Ile  
 370 375 380

Asp Leu Ala Ser Tyr Arg Glu Leu Glu Ala Phe Thr Lys Phe Gly Ser  
 385 390 395 400

Asp Leu Asp Ala Ala Thr Gln Ala Lys Leu Asn Arg Gly Arg Arg Thr  
 405 410 415

Val Glu Val Leu Lys Gln Pro Val His Lys Pro Leu Pro Val Glu Lys  
 420 425 430

Gln Val Thr Ile Leu Tyr Ala Leu Thr His Gly Phe Leu Asp Thr Val  
 435 440 445

Pro Val Asp Asp Ile Val Arg Phe Glu Glu Glu Phe His Ala Phe Phe  
 450 455 460

Asp Ala Gln His Pro Glu Ile Leu Glu Thr Ile Arg Asp Thr Lys Asp  
 465 470 475 480

Leu Pro Glu Glu Ala Val Leu Asp Ala Ala Ile Thr Glu Phe Leu Asn  
 485 490 495

Gln Ser Ser Phe Gln  
 500

<210> 692

<211> 178

<212> PRT

<213> Streptococcus pneumoniae

<400> 692

Met Asp Lys Lys Thr Val Lys Val Ile Glu Lys Tyr Ser Met Pro Phe  
 1 5 10 15

Val Gln Leu Val Leu Glu Lys Gly Glu Glu Asp Arg Ile Phe Ser Asp  
 20 25 30

Leu Thr Gln Ile Lys Gln Val Val Glu Lys Thr Gly Leu Pro Ser Phe  
 35 40 45

Leu Lys Gln Val Ala Val Asp Glu Ser Asp Lys Glu Lys Thr Ile Ala  
 50 55 60

Phe Phe Gln Asp Ser Val Ser Pro Leu Leu Gln Asn Phe Ile Gln Val  
 65 70 75 80

Leu Ala Tyr Asn His Arg Ala Asn Leu Phe Tyr Asp Val Leu Val Asp  
 85 90 95

Cys Leu Asn Arg Leu Glu Lys Glu Thr Asn Arg Phe Glu Val Thr Ile  
 100 105 110

Thr Ser Ala His Pro Leu Thr Asp Glu Gln Lys Thr Arg Leu Leu Pro  
 115 120 125

Leu Ile Glu Lys Lys Met Ser Leu Lys Val Arg Ser Val Lys Glu Gln  
 130 135 140

Ile Asp Glu Ser Leu Ile Gly Gly Phe Val Ile Phe Ala Asn His Lys  
 145 150 155 160

Thr Ile Asp Val Ser Ile Lys Gln Gln Leu Lys Val Val Lys Glu Asn  
 165 170 175

Leu Lys

<210> 693  
 <211> 164  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 693

Met His Val Thr Val Gly Glu Leu Ile Gly Asn Phe Ile Leu Ile Thr  
 1 5 10 15

Gly Ser Phe Ile Leu Leu Leu Val Leu Ile Lys Lys Phe Ala Trp Ser  
 20 25 30

Asn Ile Thr Gly Ile Phe Glu Glu Arg Ala Glu Lys Ile Ala Ser Asp  
 35 40 45

Ile Asp Arg Ala Glu Glu Ala Arg Gln Lys Ala Glu Val Leu Ala Gln  
 50 55 60

Lys Arg Glu Asp Glu Leu Ala Gly Ser Arg Lys Glu Ala Lys Thr Ile  
 65 70 75 80

Ile Glu Asn Ala Lys Glu Thr Ala Glu Gln Ser Lys Ala Asn Ile Leu  
 85 90 95

Ala Asp Ala Lys Leu Glu Ala Gly His Leu Lys Glu Lys Ala Asn Gln  
 100 105 110

Glu Ile Ala Gln Asn Lys Val Glu Ala Leu Gln Ser Val Lys Gly Glu  
 115 120 125

Val Ala Asp Leu Thr Ile Ser Leu Ala Gly Lys Ile Ile Ser Gln Asn  
 130 135 140

Leu Asp Ser His Ala His Lys Ala Leu Ile Asp Gln Tyr Ile Asp Gln  
 145 150 155 160

Leu Gly Glu Ala

<210> 694

<211> 466

<212> PRT

<213> Streptococcus pneumoniae

<400> 694

Met Asp Ala Lys Leu Arg Tyr Lys Ala Lys Lys Ile Lys Ile Val Phe  
 1 5 10 15

Phe Asp Ile Asp Asp Thr Leu Arg Asn Ser Lys Thr Gly Phe Ile Pro  
 20 25 30

Thr Thr Ile Pro Thr Val Phe Lys Gln Leu Arg Glu Lys Gly Ile Leu  
 35 40 45

Thr Gly Ile Ala Ser Gly Arg Gly Ile Phe Gly Val Val Pro Glu Ile  
 50 55 60

Arg Asp Leu Lys Pro Asp Phe Phe Val Thr Leu Asn Gly Ala Tyr Ile  
 65 70 75 80

Glu Asp Lys Lys Gly Gln Val Ile Tyr Gln His Gln Ile Glu Lys Ser  
 85 90 95

Asp Val Glu Glu Tyr Ile Ser Trp Ala Lys Gln Glu Gly Ile Glu Tyr  
 100 105 110

Gly Leu Val Gly Ser His Asp Ala Lys Leu Ser Thr Arg Thr Asp Met  
 115 120 125



Met Ser Glu Ala Ile Asn Pro Ile Tyr Pro Asp Leu Asp Val Asp Pro  
 130 135 140

Asp Phe His Glu Lys Glu Asp Ile Tyr Gln Met Trp Thr Phe Glu Asp  
 145 150 155 160

Lys Gly Asp Asp Leu His Leu Pro Asp Ser Leu Ser Asp Lys Leu Arg  
 165 170 175

Met Val Arg Trp His Gln His Ser Ser Asp Ile Val Pro Ile Ser Gly  
 180 185 190

Ser Lys Ala Thr Gly Val Glu Lys Val Val Glu His Leu Gly Leu Lys  
 195 200 205

Pro Glu Lys Val Met Val Phe Gly Asp Gly Leu Asn Asp Leu Glu Leu  
 210 215 220

Phe Asp Tyr Ala Gly Ile Ser Val Ala Met Gly Ile Ser His Asp Lys  
 225 230 235 240

Ile Lys Glu Lys Ala Asp Tyr Ile Thr Lys Thr Leu Glu Glu Asp Gly  
 245 250 255

Ile Phe Ala Ala Leu Glu Val Phe Gly Met Val Glu Lys Glu Leu His  
 260 265 270

Phe Pro Gln Val Asp Ile Glu Thr Val Glu Gly Pro Leu Ala Thr Ile  
 275 280 285

Lys Thr Asn His Gly Asp Leu Arg Ile Lys Leu Phe Pro Glu His Ala  
 290 295 300

Pro Lys Thr Val Ala Asn Phe Val Ser Leu Ser Lys Asp Gly Tyr Tyr  
 305 310 315 320

Asp Gly Val Ile Phe His Arg Ile Ile Lys Asp Phe Met Ile Gln Gly  
 325 330 335

Gly Asp Pro Thr Gly Thr Gly Met Gly Gly Glu Ser Ile Tyr Gly Glu  
 340 345 350

Ser Phe Glu Asp Glu Phe Ser Glu Glu Leu Tyr Asn Ile Arg Gly Ala  
 355 360 365

Leu Ser Met Ala Asn Ala Gly Pro Asn Thr Asn Gly Ser Gln Phe Phe  
 370 375 380

Ile Val Gln Asn Gln His Leu Pro Tyr Ser Lys Lys Glu Ile Thr Arg  
 385 390 395 400

Gly Gly Trp Pro Glu Pro Ile Ala Glu Ile Tyr Ala Asn Gln Gly Gly  
 405 410 415

Thr Pro His Leu Asp Arg Arg His Thr Val Phe Gly Gln Leu Ala Asp  
 420 425 430

Glu Ala Ser Tyr Ala Val Leu Asp Ala Ile Ala Ala Val Glu Thr Gly  
 435 440 445

Ala Met Asp Lys Pro Val Glu Asp Val Val Ile Glu Thr Ile Glu Ile  
 450 455 460

Glu Asp  
 465

<210> 695  
 <211> 79  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 695

Met Ala Gln Gln Arg Arg Gly Gly Phe Lys Arg Arg Lys Lys Val Asp  
 1 5 10 15

Tyr Ile Ala Ala Asn Lys Ile Glu Tyr Val Asp Tyr Lys Asp Thr Glu  
 20 25 30

Leu Leu Ser Arg Phe Val Ser Glu Arg Gly Lys Ile Leu Pro Arg Arg  
 35 40 45

Val Thr Gly Thr Ser Ala Lys Asn Gln Arg Lys Val Thr Thr Ala Ile  
 50 55 60

Lys Arg Ala Arg Val Met Ala Leu Met Pro Phe Val Asn Glu Asp  
 65 70 75

<210> 696

<211> 96

<212> PRT

<213> Streptococcus pneumoniae

<400> 696

Met Ala Lys Tyr Glu Ile Leu Tyr Ile Ile Arg Pro Asn Ile Glu Glu  
 1 5 10 15

Glu Ala Lys Asn Ala Leu Val Ala Arg Phe Asp Ser Ile Leu Thr Asp  
 20 25 30

Asn Gly Ala Thr Val Val Glu Ser Lys Thr Trp Glu Lys Arg Arg Leu  
 35 40 45

Ala Tyr Glu Ile Gln Asp Phe Arg Glu Gly Leu Tyr His Ile Val Asn  
 50 55 60

Val Glu Ala Asn Asp Asp Ala Ala Leu Lys Glu Phe Asp Arg Leu Ser  
 65 70 75 80

Lys Ile Asn Ala Asp Ile Leu Arg His Met Ile Val Lys Ile Asp Ala  
 85 90 95

<210> 697

<211> 531

<212> PRT

<213> Streptococcus pneumoniae

<400> 697

Met Lys Arg Ile Val Phe Glu Leu Ile Phe Ile Ala Thr Thr Trp Tyr  
 1 5 10 15

Ile Phe Leu Pro Pro Leu Asn Leu Thr Ser Trp Glu Phe Leu Phe Phe  
 20 25 30

Leu Cys Gly His Leu Leu Val Val Ala Ile Leu Phe Gly Phe Gly Lys  
 35 40 45

Gly Ile Asn Leu Val Lys Thr Val His Val Arg His Gly Lys Ala Glu  
 50 55 60

Ala Ala Leu Asn Leu Glu Gly Phe Lys Ile Asn Arg Leu Gly Lys Ile  
 65 70 75 80

Leu Leu Ala Ser Ile Gly Gly Ile Leu Leu Leu Ala Ala Leu Val Ser  
 85 90 95

Leu Val Thr Ser Ser Met Phe Gln Ala Lys Asn Tyr Ala Asn Val Val  
 100 105 110

Thr Val Thr Glu Lys Asp Phe Thr Glu Phe Pro Lys Ser Asp Thr Ser  
 115 120 125

Lys Val Pro Ile Leu Asp Arg Ser Thr Ala Glu Lys Ile Gly Asp Arg  
 130 135 140

Tyr Leu Gly Ser Leu Thr Asp Lys Val Ser Gln Tyr Val Ala Ala Asp  
 145 150 155 160

Thr Tyr Thr Gln Leu Thr Ile Asp Gly Lys Pro Tyr Arg Val Thr Pro  
 165 170 175

Leu Glu Tyr Ala Asp Pro Ile Lys Trp Phe Asn Asn Gln Ala Lys Gly  
 180 185 190

Ile Gly Glu Tyr Ile Lys Val Asp Met Val Thr Gly Asn Ala Asp Leu  
 195 200 205

Val Asp Leu Lys Thr Pro Ile Lys Tyr Ser Asp Ser Glu Tyr Phe Asn  
 210 215 220

Arg Asp Val Lys Arg His Leu Arg Leu Lys Tyr Pro Thr Lys Ile Phe  
 225 230 235 240

Lys Thr Pro Ser Phe Glu Val Asp Asp Glu Gly Asn Pro Phe Tyr Val  
 245 250 255

Ala Thr Val Tyr Gln Lys Gln Phe Gly Leu Ala Val Pro Arg Pro Ala  
 260 265 270

Ser Val Ile Ile Leu Asp Ala Thr Asn Gly Glu Thr Lys Glu Tyr Ser  
 275 280 285

Leu Ser Asp Val Pro Glu Trp Val Asp Arg Ile Tyr Pro Ala Glu Glu  
 290 295 300

Thr Ile Glu Gln Ile Asn Tyr Asn Gly Lys Tyr Lys Asp Gly Phe Leu  
 305 310 315 320

Asn Ala Met Ile Ser Lys Lys Asn Val Thr Gln Thr Thr Asn Gly Tyr  
 325 330 335

Asn Tyr Leu Ser Ile Gly Asn Asp Ile Tyr Leu Tyr Thr Gly Val Thr  
 340 345 350

Ser Ala Asn Ala Asp Glu Ser Asn Leu Gly Phe Ile Leu Glu Asn Met  
 355 360 365

Arg Thr Gly Glu Ile Thr Lys Tyr Ser Leu Ala Ser Ala Thr Glu Glu  
 370 375 380

Ser Ala Arg Glu Ser Ala Glu Gly Ala Val Gln Glu Lys Ser Tyr Lys  
 385 390 395 400

Ala Thr Phe Pro Ile Leu Ile Asn Leu Asn Asp Lys Pro Leu Tyr Ile  
 405 410 415

Met Gly Leu Lys Asp Asn Ala Gly Leu Val Lys Glu Tyr Ala Leu Val  
 420 425 430

Asp Ala Val Glu Tyr Gln Asn Val Ile Val Ala Thr Thr Val Glu Glu  
 435 440 445

Met Leu Ser Lys Tyr Ala Asn Lys Asn Asp Leu Glu Ile Asp Asn Ala  
 450 455 460

Thr Thr Glu Ser Ile Asn Gly Val Val Ala Asp Leu Lys Ser Ala Val  
 465 470 475 480

Ile Lys Gly Asp Thr Val Tyr Phe Phe Lys Val Asp Gly Lys Ile Tyr

485                                      490                                      495  
 Lys Val Lys Ala Ser Val Ser Asp Asp Leu Pro Tyr Leu Glu Asn Gly  
    500                                      505                                      510  
 Lys Thr Phe Glu Gly Gln Val Gly Lys Asp Asn Tyr Leu Lys Thr Phe  
    515                                      520                                      525  
 Lys Leu Arg  
    530  
 <210> 698  
 <211> 914  
 <212> PRT  
 <213> Streptococcus pneumoniae  
 <400> 698  
 Met Thr Glu Arg Glu Ser Val Leu His Thr Met Ser Arg Arg Arg His  
 1                                      5                                      10                                      15  
 Met Ser Lys Glu Gln Lys Arg Gln Ala Phe Tyr Thr Gln Ser Pro Glu  
    20                                      25                                      30  
 Glu Val Leu Gln Ala Val Asp Ala Thr Glu Gln Gly Leu Ser Ser Ser  
    35                                      40                                      45  
 Glu Ala Glu Lys Arg Leu Ala Glu Phe Gly His Asn Glu Leu Glu Glu  
    50                                      55                                      60  
 Gly Glu Lys Arg Ser Ile Leu Val Lys Phe Ile Glu Gln Phe Lys Asp  
 65                                      70                                      75                                      80  
 Leu Met Ile Ile Ile Leu Val Ala Ala Ala Ile Leu Ser Val Val Thr  
    85                                      90                                      95  
 Ser Gly Gly Glu Asp Ile Ala Asp Ala Ile Ile Ile Leu Ala Val Val  
    100                                      105                                      110  
 Ile Ile Asn Ala Ala Phe Gly Val Tyr Gln Glu Gly Lys Ala Glu Glu  
    115                                      120                                      125  
 Ala Ile Glu Ala Leu Lys Ser Met Ser Ser Pro Val Ala Arg Val Leu

130	135	140																	
Arg	Asp	Gly	His	Met	Ala	Glu	Ile	Asp	Ser	Lys	Glu	Leu	Val	Pro	Gly				
145					150					155					160				
Asp	Ile	Val	Ala	Leu	Glu	Ala	Gly	Asp	Val	Val	Pro	Ala	Asp	Leu	Arg				
				165					170					175					
Leu	Ile	Glu	Ala	Asn	Ser	Leu	Lys	Ile	Glu	Glu	Ala	Ala	Leu	Thr	Gly				
			180					185					190						
Glu	Ser	Val	Pro	Val	Glu	Lys	Asp	Leu	Ser	Val	Glu	Leu	Ala	Thr	Asp				
		195					200					205							
Ala	Gly	Ile	Gly	Asp	Arg	Val	Asn	Met	Ala	Phe	Gln	Asn	Ser	Asn	Val				
210						215					220								
Thr	Tyr	Gly	Arg	Gly	Met	Gly	Val	Val	Val	Asn	Thr	Gly	Met	Tyr	Thr				
225					230					235					240				
Glu	Val	Gly	His	Ile	Ala	Gly	Met	Leu	Gln	Asp	Ala	Asp	Glu	Thr	Asp				
				245					250					255					
Thr	Pro	Leu	Lys	Gln	Asn	Leu	Asn	Asn	Leu	Ser	Lys	Val	Leu	Thr	Tyr				
			260					265					270						
Ala	Ile	Leu	Val	Ile	Ala	Leu	Val	Thr	Phe	Val	Val	Gly	Val	Phe	Ile				
		275					280					285							
Gln	Gly	Lys	Asn	Pro	Leu	Gly	Glu	Leu	Leu	Thr	Ser	Val	Ala	Leu	Ala				
290						295					300								
Val	Ala	Ala	Ile	Pro	Glu	Gly	Leu	Pro	Ala	Ile	Val	Thr	Ile	Val	Leu				
305					310					315					320				
Ser	Leu	Gly	Thr	Gln	Val	Leu	Ala	Lys	Arg	His	Ser	Ile	Val	Arg	Lys				
				325					330					335					
Leu	Pro	Ala	Val	Glu	Thr	Leu	Gly	Ser	Thr	Glu	Ile	Ile	Ala	Ser	Asp				
			340					345					350						

Lys Thr Gly Thr Leu Thr Met Asn Lys Met Thr Val Glu Lys Val Phe  
 355 360 365

Tyr Asp Ala Val Leu His Asp Ser Ala Asp Asp Ile Glu Leu Gly Leu  
 370 375 380

Glu Met Pro Leu Leu Arg Ser Val Val Leu Ala Asn Asp Thr Lys Ile  
 385 390 395 400

Asp Val Glu Gly Asn Leu Ile Gly Asp Pro Thr Glu Thr Ala Phe Ile  
 405 410 415

Gln Tyr Ala Leu Asp Lys Gly Tyr Asp Val Lys Gly Phe Leu Glu Lys  
 420 425 430

Tyr Pro Arg Val Ala Glu Leu Pro Phe Asp Ser Asp Arg Lys Leu Met  
 435 440 445

Ser Thr Val His Pro Leu Pro Asp Gly Arg Phe Leu Val Ala Val Lys  
 450 455 460

Gly Ala Pro Asp Gln Leu Leu Lys Arg Cys Leu Leu Arg Asp Lys Ala  
 465 470 475 480

Gly Asp Ile Ala Pro Ile Asp Glu Lys Val Thr Asn Leu Ile Arg Thr  
 485 490 495

Asn Asn Ser Glu Met Ala His Gln Ala Leu Arg Val Leu Ala Gly Ala  
 500 505 510

Tyr Lys Ile Ile Asp Ser Ile Pro Glu Asn Leu Thr Ser Glu Glu Leu  
 515 520 525

Glu Asn Asp Leu Ile Phe Thr Gly Leu Ile Gly Met Ile Asp Pro Glu  
 530 535 540

Arg Pro Glu Ala Ala Glu Ala Val Arg Val Ala Lys Glu Ala Gly Ile  
 545 550 555 560

Arg Pro Ile Met Ile Thr Gly Asp His Gln Asp Thr Ala Glu Ala Ile  
 565 570 575



Ala Lys Arg Leu Gly Ile Ile Asp Ala Asn Asp Thr Glu Gly His Val  
580 585 590

Leu Thr Gly Ala Glu Leu Asn Glu Leu Ser Asp Glu Glu Phe Glu Lys  
595 600 605

Val Val Gly Gln Tyr Ser Val Tyr Ala Arg Val Ser Pro Glu His Lys  
610 615 620

Val Arg Ile Val Lys Ala Trp Gln Lys Gln Gly Lys Val Val Ala Met  
625 630 635 640

Thr Gly Asp Gly Val Asn Asp Ala Pro Ala Leu Lys Thr Ala Asp Ile  
645 650 655

Gly Ile Gly Met Gly Ile Thr Gly Thr Glu Val Ser Lys Gly Ala Ser  
660 665 670

Asp Met Ile Leu Ala Asp Asp Asn Phe Ala Thr Ile Ile Val Ala Val  
675 680 685

Glu Glu Gly Arg Lys Val Phe Ser Asn Ile Gln Lys Thr Ile Gln Tyr  
690 695 700

Leu Leu Ser Ala Asn Thr Ala Glu Val Leu Thr Ile Phe Leu Ser Thr  
705 710 715 720

Leu Phe Gly Trp Asp Val Leu Gln Pro Val His Leu Leu Trp Ile Asn  
725 730 735

Leu Val Thr Asp Thr Phe Pro Ala Ile Ala Leu Gly Val Glu Pro Ala  
740 745 750

Glu Pro Gly Val Met Asn His Lys Pro Arg Gly Arg Lys Ala Ser Phe  
755 760 765

Phe Ser Gly Gly Val Leu Ser Ser Ile Ile Tyr Gln Gly Val Leu Gln  
770 775 780

Ala Ala Leu Val Met Ser Val Tyr Gly Leu Ala Ile Ala Tyr Pro Val  
785 790 795 800

His Val Gly Asp Asn His Ala Ile His Ala Asp Ala Leu Thr Met Ala  
                             805                            810                            815

Phe Ala Thr Leu Gly Leu Ile Gln Leu Phe His Ala Tyr Asn Val Lys  
                             820                            825                            830

Ser Val Tyr Gln Ser Ile Leu Thr Val Gly Pro Phe Lys Ser Lys Thr  
                             835                            840                            845

Phe Asn Trp Ser Ile Leu Val Ser Phe Ile Leu Leu Met Ala Thr Ile  
                             850                            855                            860

Val Val Glu Pro Leu Glu Gly Ile Phe His Val Thr Lys Leu Asp Leu  
                             865                            870                            875                            880

Ser Gln Trp Gly Ile Val Met Ala Gly Ser Phe Ser Met Ile Ile Ile  
                             885                            890                            895

Val Glu Ile Val Lys Phe Ile Gln Arg Lys Leu Gly Phe Asp Lys Asn  
                             900                            905                            910

Ala Ile

<210> 699  
 <211> 292  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 699

Met Ile Gly Arg Ile Ser Gly Met Asn Phe Gln Gln Leu Ser Asn Leu  
   1                            5                            10                            15

Gln Tyr Trp Thr Ser Leu Phe Ala Ser Pro Trp Thr Ile Ala Ile Asn  
                             20                            25                            30

Leu Ile Asp Ile Leu Ile Val Ala Tyr Ile Leu Tyr His Phe Thr Lys  
                             35                            40                            45

Ala Ile Ala Gly Thr Lys Ile Met Ile Leu Val Arg Gly Val Leu Val  
                             50                            55                            60

Phe Ile Leu Ala Gln Ile Leu Ala Asn Met Ile Gly Leu Thr Thr Ile  
 65 70 75 80

Ser Trp Leu Ile Asn Gln Ile Ile Thr Tyr Gly Val Ile Ala Ala Val  
 85 90 95

Val Ile Phe Ser Pro Glu Ile Arg Thr Gly Leu Glu Arg Leu Gly Arg  
 100 105 110

Ala Thr Asp Phe Phe Ser Asn Ala Pro Ile Ser Ala Glu Glu Gln Met  
 115 120 125

Ile Arg Ala Phe Val Lys Ser Val Glu Tyr Met Ser Pro Arg Lys Ile  
 130 135 140

Gly Ala Leu Val Ala Ile Gln Arg Val Arg Thr Leu Gln Glu Tyr Ile  
 145 150 155 160

Ser Thr Gly Ile Pro Leu Asp Ala Lys Ile Ser Ala Glu Leu Leu Ile  
 165 170 175

Asn Ile Phe Ile Pro Asn Thr Pro Leu His Asp Gly Ala Val Ile Ile  
 180 185 190

Lys Glu Glu Arg Ile Ala Val Thr Ser Ala Tyr Leu Pro Leu Thr Lys  
 195 200 205

Asn Thr Gly Ile Ser Lys Glu Phe Gly Thr Arg His Arg Ala Ala Ile  
 210 215 220

Gly Leu Ser Glu Val Ser Asp Ala Leu Thr Phe Val Val Ser Glu Glu  
 225 230 235 240

Thr Gly Gly Ile Ser Ile Thr Tyr Asn Gly Arg Phe Lys His Asn Leu  
 245 250 255

Thr Leu Asp Glu Phe Glu Thr Glu Leu Arg Glu Ile Leu Leu Pro Lys  
 260 265 270

Glu Glu Val Gly Leu Ser Phe Lys Glu Arg Leu Leu Gly Gly Trp Lys

275                      280                      285  
 His Glu Lys Lys  
 290  
 <210> 700  
 <211> 410  
 <212> PRT  
 <213> Streptococcus pneumoniae  
 <400> 700  
 Met Ser Thr Asn Arg Lys Asn Asp Met Met Val Tyr Cys Ser Phe Cys  
 1                      5                      10                      15  
 Gly Lys Asn Gln Glu Glu Val Gln Lys Ile Ile Ala Gly Asn Asn Ala  
 20                      25                      30  
 Phe Ile Cys Asn Glu Cys Val Glu Leu Ala Gln Glu Ile Ile Arg Glu  
 35                      40                      45  
 Glu Leu Val Glu Glu Val Leu Ala Asp Leu Ser Glu Val Pro Lys Pro  
 50                      55                      60  
 Ile Glu Leu Leu His Ile Leu Asn His Tyr Val Ile Gly Gln Asp Arg  
 65                      70                      75                      80  
 Ala Lys Arg Ala Leu Ala Val Ala Val Tyr Asn His Tyr Lys Arg Ile  
 85                      90                      95  
 Asn Phe His Asp Thr Arg Glu Glu Ser Glu Asp Val Asp Leu Gln Lys  
 100                      105                      110  
 Ser Asn Ile Leu Met Ile Gly Pro Thr Gly Ser Gly Lys Thr Phe Leu  
 115                      120                      125  
 Ala Gln Thr Leu Ala Lys Ser Leu Asn Val Pro Phe Ala Ile Ala Asp  
 130                      135                      140  
 Ala Thr Ala Leu Thr Glu Ala Gly Tyr Val Gly Glu Asp Val Glu Asn  
 145                      150                      155                      160  
 Ile Leu Leu Lys Leu Leu Gln Val Ala Asp Phe Asn Ile Glu Arg Ala

165	170	175
Glu Arg Gly Ile Ile Tyr Val Asp Glu Ile Asp Lys Ile Ala Lys Lys		
180	185	190
Ser Glu Asn Val Ser Ile Thr Arg Asp Val Ser Gly Glu Gly Val Gln		
195	200	205
Gln Ala Leu Leu Lys Ile Ile Glu Gly Thr Val Ala Ser Val Pro Pro		
210	215	220
Gln Gly Gly Arg Lys His Pro Gln Gln Glu Met Ile Gln Val Asp Thr		
225	230	235
Lys Asn Ile Leu Phe Ile Val Gly Gly Ala Phe Asp Gly Ile Glu Glu		
245	250	255
Ile Val Lys Gln Arg Leu Gly Glu Lys Val Ile Gly Phe Gly Gln Asn		
260	265	270
Asn Lys Ala Ile Asp Glu Asn Ser Ser Tyr Met Gln Glu Ile Ile Ala		
275	280	285
Glu Asp Ile Gln Lys Phe Gly Ile Ile Pro Glu Leu Ile Gly Arg Leu		
290	295	300
Pro Val Phe Ala Ala Leu Glu Gln Leu Thr Val Asp Asp Leu Val Arg		
305	310	315
Ile Leu Lys Glu Pro Arg Asn Ala Leu Val Lys Gln Tyr Gln Thr Leu		
325	330	335
Leu Ser Tyr Asp Asp Val Glu Leu Glu Phe Asp Asp Glu Ala Leu Gln		
340	345	350
Glu Ile Ala Asn Lys Ala Ile Glu Arg Lys Thr Gly Ala Arg Gly Leu		
355	360	365
Arg Ser Ile Ile Glu Glu Thr Met Leu Asp Val Met Phe Glu Val Pro		
370	375	380

Ser Gln Glu Asn Val Lys Leu Val Arg Ile Thr Lys Glu Thr Val Asp  
 385 390 395 400

Gly Thr Asp Lys Pro Ile Leu Glu Thr Ala  
 405 410

<210> 701  
 <211> 376  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 701

Met Val Glu Leu Asn Leu Lys Asn Ile Tyr Lys Lys Tyr Pro Asn Ser  
 1 5 10 15

Glu His Tyr Ser Val Glu Asp Phe Asn Leu Asn Ile Lys Asp Lys Glu  
 20 25 30

Phe Ile Val Phe Val Gly Pro Ser Gly Cys Gly Lys Ser Thr Thr Leu  
 35 40 45

Arg Met Ile Ala Gly Leu Glu Asp Ile Thr Glu Gly Thr Ala Ser Ile  
 50 55 60

Asp Gly Val Val Val Asn Asp Val Ala Pro Lys Asp Arg Asp Ile Ala  
 65 70 75 80

Met Val Phe Gln Asn Tyr Ala Leu Tyr Pro His Met Thr Val Tyr Asp  
 85 90 95

Asn Met Ala Phe Gly Leu Lys Leu Arg Lys Tyr Ser Lys Glu Asp Ile  
 100 105 110

Asn Lys Arg Val Gln Glu Ala Ala Glu Ile Leu Gly Leu Lys Glu Phe  
 115 120 125

Leu Glu Arg Lys Pro Ala Asp Leu Ser Gly Gly Gln Arg Gln Arg Val  
 130 135 140

Ala Met Gly Arg Ala Ile Val Arg Asp Ala Lys Val Phe Leu Met Asp  
 145 150 155 160

Glu Pro Leu Ser Asn Leu Asp Ala Lys Leu Arg Val Ser Met Arg Ala  
 165 170 175

Glu Ile Ala Lys Ile His Arg Arg Ile Gly Ala Thr Thr Ile Tyr Val  
 180 185 190

Thr His Asp Gln Thr Glu Ala Met Thr Leu Ala Asp Arg Ile Val Ile  
 195 200 205

Met Ser Ala Thr Lys Asn Pro Ala Gly Thr Gly Thr Ile Gly Arg Val  
 210 215 220

Glu Gln Ile Gly Thr Pro Gln Glu Val Tyr Lys Asn Pro Val Asn Lys  
 225 230 235 240

Phe Val Ala Gly Phe Ile Gly Ser Pro Ala Met Asn Phe Ile Thr Val  
 245 250 255

Lys Leu Val Gly Ser Glu Ile Val Ser Asp Gly Phe Arg Leu Lys Val  
 260 265 270

Pro Glu Gly Ala Leu Lys Val Leu Arg Glu Lys Gly Tyr Glu Gly Lys  
 275 280 285

Glu Leu Ile Phe Gly Ile Arg Pro Glu Asp Val Asn Ala Glu Pro Ala  
 290 295 300

Phe Leu Glu Thr Phe Pro Asp Cys Val Val Lys Ala Thr Ile Ser Val  
 305 310 315 320

Ser Glu Leu Leu Gly Ser Glu Ser His Leu Tyr Cys Gln Val Gly Lys  
 325 330 335

Asp Glu Phe Val Ala Lys Val Asp Ala Arg Asp Tyr Leu Gln Thr Gly  
 340 345 350

Ala Thr Val Glu Leu Gly Phe Asp Leu Asn Lys Ala His Phe Phe Asp  
 355 360 365

Val Glu Thr Glu Lys Thr Ile Tyr  
 370 375

<210> 702  
 <211> 524  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 702

Met Lys Phe Asn Glu Leu Asn Leu Ser Ala Asp Leu Leu Ala Glu Ile  
 1 5 10 15

Glu Lys Ala Gly Phe Val Glu Ala Ser Pro Ile Gln Glu Gln Thr Ile  
 20 25 30

Pro Leu Ala Leu Glu Gly Lys Asp Val Ile Gly Gln Ala Gln Thr Gly  
 35 40 45

Thr Gly Lys Thr Ala Ala Phe Gly Leu Pro Thr Leu Glu Lys Ile Arg  
 50 55 60

Thr Glu Glu Ala Thr Ile Gln Ala Leu Val Ile Ala Pro Thr Arg Glu  
 65 70 75 80

Leu Ala Val Gln Ser Gln Glu Glu Leu Phe Arg Phe Gly Arg Ser Lys  
 85 90 95

Gly Val Lys Val Arg Ser Val Tyr Gly Gly Ser Ser Ile Glu Lys Gln  
 100 105 110

Ile Lys Ala Leu Lys Ser Gly Ala His Ile Val Val Gly Thr Pro Gly  
 115 120 125

Arg Leu Leu Asp Leu Ile Lys Arg Lys Ala Leu Lys Leu Gln Asp Ile  
 130 135 140

Glu Thr Leu Ile Leu Asp Glu Ala Asp Glu Met Leu Asn Met Gly Phe  
 145 150 155 160

Leu Glu Asp Ile Glu Ala Ile Ile Ser Arg Val Pro Glu Asn Arg Gln  
 165 170 175

Thr Leu Leu Phe Ser Ala Thr Met Pro Asp Ala Ile Lys Arg Ile Gly  
 180 185 190



Val Gln Phe Met Lys Ala Pro Glu His Val Lys Ile Ala Ala Lys Glu  
 195 200 205

Leu Thr Thr Glu Leu Val Asp Gln Tyr Tyr Ile Arg Val Lys Glu Gln  
 210 215 220

Glu Lys Phe Asp Thr Met Thr Arg Leu Met Asp Val Ala Gln Pro Glu  
 225 230 235 240

Leu Ala Ile Val Phe Gly Arg Thr Lys Arg Arg Val Asp Glu Leu Thr  
 245 250 255

Arg Gly Leu Lys Ile Arg Gly Phe Arg Ala Glu Gly Ile His Gly Asp  
 260 265 270

Leu Asp Gln Asn Lys Arg Leu Arg Val Leu Arg Asp Phe Lys Asn Gly  
 275 280 285

Asn Leu Asp Val Leu Val Ala Thr Asp Val Ala Ala Arg Gly Leu Asp  
 290 295 300

Ile Ser Gly Val Thr His Val Tyr Asn Tyr Asp Ile Pro Gln Asp Pro  
 305 310 315 320

Glu Ser Tyr Val His Arg Ile Gly Arg Thr Gly Arg Ala Gly Lys Ser  
 325 330 335

Gly Gln Ser Ile Thr Phe Val Ala Pro Asn Glu Met Gly Tyr Leu Gln  
 340 345 350

Ile Ile Glu Asn Leu Thr Lys Lys Arg Met Lys Gly Leu Lys Pro Ala  
 355 360 365

Ser Val Glu Glu Ser Phe Gln Ser Lys Lys Gln Val Ala Leu Lys Lys  
 370 375 380

Ile Glu Arg Asp Phe Ala Asp Glu Thr Ile Arg Ala Asn Phe Glu Lys  
 385 390 395 400

Phe Gly Lys Asp Ala Arg Lys Leu Ala Ala Glu Phe Thr Pro Glu Glu  
 405 410 415

Leu Ala Met Tyr Ile Leu Ser Leu Thr Val Gln Asp Pro Asp Ser Leu  
 420 425 430

Pro Glu Val Glu Ile Ala Arg Glu Lys Pro Leu Pro Phe Lys Pro Ser  
 435 440 445

Gly Asn Gly Phe Gly Gly Lys Ala Lys Gly Gly Arg Gly Gly Arg Arg  
 450 455 460

Gly Asp Asp Arg Arg Glu Arg Asp Arg Arg Gly Asn Gly Arg Arg Asp  
 465 470 475 480

Glu Phe Lys Lys Gly Ser Arg Gly Asn Asp Arg Phe Asp Lys Glu Lys  
 485 490 495

Arg Tyr Arg Lys Asp Asn Lys Lys Pro Arg Asn Thr Leu Ser Glu Lys  
 500 505 510

Gln Thr Gly Phe Val Ile Arg Asn Lys Gly Asp Lys  
 515 520

<210> 703

<211> 438

<212> PRT

<213> Streptococcus pneumoniae

<400> 703

Met Leu Thr Tyr Asp Leu Ile Val Ile Gly Phe Gly Lys Ala Gly Lys  
 1 5 10 15

Thr Leu Ala Gly Lys Leu Ala Ser Ala Gly Lys Lys Val Ala Leu Val  
 20 25 30

Glu Arg Ser Lys Ala Met Tyr Gly Gly Thr Cys Ile Asn Ile Gly Cys  
 35 40 45

Ile Pro Thr Lys Thr Leu Leu Val Ala Ala Glu Lys Asp Leu Ser Phe  
 50 55 60

Glu Glu Val Ile Ala Thr Lys Asn Thr Ile Thr Gly Arg Leu Asn Gly  
 65 70 75 80

Lys Asn Tyr Ala Thr Val Ala Gly Thr Gly Val Asp Ile Phe Asp Ala  
                             85                            90                            95

Glu Ala His Phe Leu Ser Asn Lys Val Ile Glu Ile Gln Ala Gly Asp  
                             100                            105                            110

Glu Lys Lys Glu Leu Thr Ala Glu Thr Ile Val Ile Asn Thr Gly Ala  
                             115                            120                            125

Val Ser Asn Val Leu Pro Ile Pro Gly Leu Ala Thr Ser Lys Asn Ile  
                             130                            135                            140

Phe Asp Ser Thr Gly Ile Gln Ser Leu Asp Lys Leu Pro Glu Lys Leu  
 145                            150                            155                            160

Gly Ile Leu Gly Gly Gly Asn Ile Gly Leu Glu Phe Ala Gly Leu Tyr  
                             165                            170                            175

Asn Lys Leu Gly Ser Lys Val Thr Val Leu Asp Ala Leu Asp Thr Phe  
                             180                            185                            190

Leu Pro Arg Ala Glu Pro Ser Ile Ala Ala Leu Ala Lys Gln Tyr Met  
                             195                            200                            205

Glu Glu Asp Gly Ile Glu Leu Leu Gln Asn Ile His Thr Thr Glu Ile  
                             210                            215                            220

Lys Asn Asp Gly Asp Gln Val Leu Val Val Thr Glu Asp Glu Thr Tyr  
 225                            230                            235                            240

Arg Phe Asp Ala Leu Leu Tyr Ala Thr Gly Arg Lys Pro Asn Val Glu  
                             245                            250                            255

Pro Leu Gln Leu Glu Asn Thr Asp Ile Glu Leu Thr Glu Arg Gly Ala  
                             260                            265                            270

Ile Lys Val Asp Lys His Cys Gln Thr Asn Val Pro Gly Val Phe Ala  
                             275                            280                            285

Val Gly Asp Val Asn Gly Gly Leu Gln Phe Thr Tyr Ile Ser Leu Asp

290                      295                      300  
 Asp Phe Arg Val Val Tyr Ser Tyr Leu Ala Gly Asp Gly Ser Tyr Thr  
 305                      310                      315                      320  
 Leu Glu Asp Arg Leu Asn Val Pro Asn Thr Met Phe Ile Thr Pro Ala  
 325                      330                      335  
 Leu Ser Gln Val Gly Leu Thr Glu Ser Gln Ala Ala Asp Leu Lys Leu  
 340                      345                      350  
 Pro Tyr Ala Val Lys Glu Ile Pro Val Ala Ala Met Pro Arg Gly His  
 355                      360                      365  
 Val Asn Gly Asp Leu Arg Gly Ala Phe Lys Ala Val Val Asn Thr Glu  
 370                      375                      380  
 Thr Lys Glu Ile Leu Gly Ala Ser Ile Phe Ser Glu Gly Ser Gln Glu  
 385                      390                      395                      400  
 Ile Ile Asn Ile Ile Thr Val Ala Met Asp Asn Lys Ile Pro Tyr Thr  
 405                      410                      415  
 Tyr Phe Thr Lys Gln Ile Phe Thr His Pro Thr Leu Ala Glu Asn Leu  
 420                      425                      430  
 Asn Asp Leu Phe Ala Ile  
 435  
 <210> 704  
 <211> 778  
 <212> PRT  
 <213> Streptococcus pneumoniae  
 <400> 704  
 Met Asp Lys Asn Lys Ile Met Gly Leu Thr Gln Arg Glu Val Lys Glu  
 1                      5                      10                      15  
 Arg Gln Ala Glu Gly Leu Val Asn Asp Phe Thr Ala Ser Ala Ser Thr  
 20                      25                      30  
 Ser Thr Trp Gln Ile Val Lys Arg Asn Val Phe Thr Leu Phe Asn Ala

35	40	45													
Leu Asn Phe Ala Ile Ala	Leu Ala Leu Ala Phe Val	Gln Ala Trp Ser													
50	55	60													
Asn Leu Val Phe Phe Ala Val	Ile Cys Phe Asn Ala Phe Ser Gly Ile														
65	70	75													80
Val Thr Glu Leu Arg Ala Lys His Met Val	Asp Lys Leu Asn Leu Met														
	85	90													95
Thr Lys Glu Lys Val Lys Thr Ile Arg Asp Gly Gln Glu Val Ala Leu															
	100	105													110
Asn Pro Glu Glu Leu Val Leu Gly Asp Val Ile Arg Leu Ser Ala Gly															
	115	120													125
Glu Gln Ile Pro Ser Asp Ala Leu Val Leu Glu Gly Phe Ala Glu Val															
	130	135													140
Asn Glu Ala Met Leu Thr Gly Glu Ser Asp Leu Val Gln Lys Glu Val															
	145	150													155
Asp Gly Leu Leu Leu Ser Gly Ser Phe Leu Ala Ser Gly Ser Val Leu															
	165	170													175
Ser Gln Val His His Val Gly Ala Asp Asn Tyr Ala Ala Lys Leu Met															
	180	185													190
Leu Glu Ala Lys Thr Val Lys Pro Ile Asn Ser Arg Ile Met Lys Ser															
	195	200													205
Leu Asp Lys Leu Ala Gly Phe Thr Gly Lys Ile Ile Ile Pro Phe Gly															
	210	215													220
Leu Ala Leu Leu Leu Glu Ala Leu Leu Leu Lys Gly Leu Pro Leu Lys															
	225	230													235
Ser Ser Val Val Asn Ser Ser Thr Ala Leu Leu Gly Met Leu Pro Lys															
	245	250													255

Gly Ile Ala Leu Leu Thr Ile Thr Ser Leu Leu Thr Ala Val Ile Lys  
 260 265 270

Leu Gly Leu Lys Lys Val Leu Val Gln Glu Met Tyr Ser Val Glu Thr  
 275 280 285

Leu Ala Arg Val Asp Met Leu Cys Leu Asp Lys Thr Gly Thr Ile Thr  
 290 295 300

Gln Gly Lys Met Gln Val Glu Ala Val Leu Pro Leu Thr Glu Thr Tyr  
 305 310 315 320

Gly Glu Glu Ala Ile Ala Ser Ile Leu Thr Ser Tyr Met Ala His Ser  
 325 330 335

Glu Asp Lys Asn Pro Thr Ala Gln Ala Ile Arg Gln Arg Phe Val Gly  
 340 345 350

Asp Val Ala Tyr Pro Met Ile Ser Asn Leu Pro Phe Ser Ser Asp Arg  
 355 360 365

Lys Trp Gly Ala Met Glu Leu Glu Gly Leu Gly Thr Val Phe Leu Gly  
 370 375 380

Ala Pro Glu Met Leu Leu Asp Ser Glu Val Pro Glu Ala Arg Glu Ala  
 385 390 395 400

Leu Glu Arg Gly Ser Arg Val Leu Val Leu Ala Leu Ser Gln Glu Lys  
 405 410 415

Leu Asp His His Lys Pro Gln Lys Pro Ser Asp Ile Gln Ala Leu Ala  
 420 425 430

Leu Leu Glu Ile Leu Asp Pro Ile Arg Glu Gly Ala Ala Glu Thr Leu  
 435 440 445

Asp Tyr Leu Arg Ser Gln Glu Val Gly Leu Lys Ile Ile Ser Gly Asp  
 450 455 460

Asn Pro Val Thr Val Ser Ser Ile Ala Gln Lys Ala Gly Phe Ala Asp  
 465 470 475 480

Tyr His Ser Tyr Val Asp Cys Ser Lys Ile Thr Asp Glu Glu Leu Met  
 485 490 495

Ala Met Ala Glu Glu Thr Ala Ile Phe Gly Arg Val Ser Pro His Gln  
 500 505 510

Lys Lys Leu Ile Ile Gln Thr Leu Lys Lys Ala Gly His Thr Thr Ala  
 515 520 525

Met Thr Gly Asp Gly Val Asn Asp Ile Leu Ala Leu Arg Glu Ala Asp  
 530 535 540

Cys Ser Ile Val Met Ala Glu Gly Asp Pro Ala Thr Arg Gln Ile Ala  
 545 550 555 560

Asn Leu Val Leu Leu Asn Ser Asp Phe Asn Asp Val Pro Glu Ile Leu  
 565 570 575

Phe Glu Gly Arg Arg Val Val Asn Asn Ile Ala His Ile Ala Pro Ile  
 580 585 590

Phe Leu Ile Lys Thr Ile Tyr Ser Phe Leu Leu Ala Val Ile Cys Ile  
 595 600 605

Ala Ser Ala Leu Leu Gly Arg Ser Glu Trp Ile Leu Ile Phe Pro Phe  
 610 615 620

Ile Pro Ile Gln Ile Thr Met Ile Asp Gln Phe Val Glu Gly Phe Pro  
 625 630 635 640

Pro Phe Val Leu Thr Phe Glu Arg Asn Ile Lys Pro Val Glu Gln Asn  
 645 650 655

Phe Leu Arg Lys Ser Met Leu Arg Ala Leu Pro Ser Ala Leu Met Val  
 660 665 670

Val Phe Ser Val Leu Phe Val Lys Met Phe Gly Ala Ser Gln Gly Trp  
 675 680 685

Ser Glu Leu Glu Ile Ser Thr Leu Leu Tyr Tyr Leu Leu Gly Ser Ile  
 690 695 700

Gly Phe Leu Ser Val Phe Arg Ala Cys Met Pro Phe Thr Leu Trp Arg  
 705 710 715 720

Val Leu Leu Ile Val Trp Ser Val Gly Gly Phe Leu Ala Thr Ala Leu  
 725 730 735

Phe Pro Arg Ile Gln Lys Leu Leu Glu Ile Ser Thr Leu Thr Glu Gln  
 740 745 750

Thr Leu Pro Val Tyr Gly Val Met Met Leu Val Phe Thr Val Ile Phe  
 755 760 765

Ile Leu Thr Ser Arg Tyr Gln Ala Lys Lys  
 770 775

<210> 705  
 <211> 89  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 705

Met Ala Ile Ser Lys Glu Lys Lys Asn Glu Ile Ile Ala Gln Tyr Ala  
 1 5 10 15

Arg His Glu Gly Asp Thr Gly Ser Val Glu Val Gln Val Ala Val Leu  
 20 25 30

Thr Trp Glu Ile Asn His Leu Asn Glu His Ile Lys Gln His Lys Lys  
 35 40 45

Asp His Ala Thr Tyr Arg Gly Leu Met Lys Lys Ile Gly Arg Arg Arg  
 50 55 60

Asn Leu Leu Ala Tyr Leu Arg Lys Asn Asp Val Asn Arg Tyr Arg Glu  
 65 70 75 80

Leu Ile Asn Ser Leu Gly Leu Arg Arg  
 85

<210> 706  
 <211> 630



&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 706

Met Thr Arg Tyr Gln Asp Asp Phe Tyr Asp Ala Ile Asn Gly Glu Trp  
 1 5 10 15

Gln Gln Thr Ala Glu Ile Pro Ala Asp Lys Ser Gln Thr Gly Gly Phe  
 20 25 30

Val Asp Leu Asp Gln Glu Ile Glu Asp Leu Met Leu Ala Thr Thr Asp  
 35 40 45

Lys Trp Leu Ala Gly Glu Glu Val Pro Glu Asp Ala Ile Leu Glu Asn  
 50 55 60

Phe Val Lys Tyr His Arg Leu Val Arg Asp Phe Asp Lys Arg Glu Ala  
 65 70 75 80

Asp Gly Ile Thr Pro Val Leu Pro Leu Leu Lys Glu Phe Gln Glu Leu  
 85 90 95

Glu Thr Phe Ala Asp Phe Thr Ala Lys Leu Ala Glu Phe Glu Leu Ala  
 100 105 110

Gly Lys Pro Asn Phe Leu Pro Phe Gly Val Ser Pro Asp Phe Met Asp  
 115 120 125

Ala Arg Ile Asn Val Leu Trp Ala Ser Ala Pro Ser Thr Ile Leu Pro  
 130 135 140

Asp Thr Thr Tyr Tyr Ala Glu Glu His Pro Gln Arg Glu Glu Leu Leu  
 145 150 155 160

Thr Leu Trp Lys Glu Ser Ser Ala Asn Leu Leu Lys Ala Tyr Asp Phe  
 165 170 175

Ser Asp Glu Glu Ile Glu Asp Leu Leu Glu Lys Arg Leu Glu Leu Asp  
 180 185 190

Arg Arg Val Ala Ala Val Val Leu Ser Asn Glu Glu Ser Ser Glu Tyr  
 195 200 205

Ala Lys Leu Tyr His Pro Tyr Ser Tyr Glu Asp Phe Lys Lys Phe Ala  
 210 215 220  
 Pro Ala Leu Pro Leu Asp Asp Phe Phe Lys Ala Val Ile Gly Gln Leu  
 225 230 235 240  
 Pro Asp Lys Val Ile Val Asp Glu Glu Arg Phe Trp Gln Ala Ala Glu  
 245 250 255  
 Gln Phe Tyr Ser Glu Glu Ala Trp Ser Leu Leu Lys Ala Thr Leu Ile  
 260 265 270  
 Leu Ser Val Val Asn Leu Ser Thr Ser Tyr Leu Thr Glu Asp Ile Arg  
 275 280 285  
 Val Leu Ser Gly Ala Tyr Ser Arg Ala Leu Ser Gly Val Pro Glu Ala  
 290 295 300  
 Lys Asp Lys Val Lys Ala Ala Tyr His Leu Ala Gln Glu Pro Phe Lys  
 305 310 315 320  
 Gln Ala Leu Gly Leu Trp Tyr Ala Arg Glu Lys Phe Ser Pro Glu Ala  
 325 330 335  
 Lys Ala Asp Val Glu Lys Lys Val Ala Thr Met Ile Asp Val Tyr Lys  
 340 345 350  
 Glu Arg Leu Leu Lys Asn Asp Trp Leu Thr Pro Glu Thr Cys Lys Gln  
 355 360 365  
 Ala Ile Val Lys Leu Asn Val Ile Lys Pro Tyr Ile Gly Tyr Pro Glu  
 370 375 380  
 Glu Leu Pro Ala Arg Tyr Lys Asp Lys Val Val Asn Glu Thr Ala Ser  
 385 390 395 400  
 Leu Phe Glu Asn Ala Leu Ala Phe Ala Arg Val Glu Ile Lys His Ser  
 405 410 415  
 Trp Ser Lys Trp Asn Gln Pro Val Asp Tyr Lys Glu Trp Gly Met Pro

420	425	430
Ala His Met Val Asn Ala Tyr Tyr Asn Pro Gln Lys Asn Leu Ile Val		
435	440	445
Phe Pro Ala Ala Ile Leu Gln Ala Pro Phe Tyr Asp Leu His Gln Ser		
450	455	460
Ser Ser Ala Asn Tyr Gly Gly Ile Gly Ala Val Ile Ala His Glu Ile		
465	470	475
Ser His Ala Phe Asp Thr Asn Gly Ala Ser Phe Asp Glu Asn Gly Ser		
485	490	495
Leu Lys Asp Trp Trp Thr Glu Ser Asp Tyr Ala Ala Phe Lys Glu Lys		
500	505	510
Thr Gln Lys Val Ile Asp Gln Phe Asp Gly Gln Asp Ser Tyr Gly Ala		
515	520	525
Thr Ile Asn Gly Lys Leu Thr Val Ser Glu Asn Val Ala Asp Leu Gly		
530	535	540
Gly Ile Ala Ala Ala Leu Glu Ala Ala Lys Arg Glu Ala Asp Phe Ser		
545	550	555
Ala Glu Glu Phe Phe Tyr Asn Phe Gly Arg Ile Trp Arg Met Lys Gly		
565	570	575
Arg Pro Glu Phe Met Lys Leu Leu Ala Ser Val Asp Val His Ala Pro		
580	585	590
Ala Lys Leu Arg Val Asn Val Gln Val Pro Asn Phe Asp Asp Phe Phe		
595	600	605
Thr Thr Tyr Asp Val Lys Glu Gly Asp Gly Met Trp Arg Ser Pro Glu		
610	615	620
Glu Arg Val Ile Ile Trp		
625	630	

&lt;210&gt; 707

&lt;211&gt; 230

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 707

Met Val Lys Leu Val Phe Ala Arg His Gly Glu Ser Glu Trp Asn Lys  
 1 5 10 15

Ala Asn Leu Phe Thr Gly Trp Ala Asp Val Asp Leu Ser Glu Lys Gly  
 20 25 30

Thr Gln Gln Ala Ile Asp Ala Gly Lys Leu Ile Lys Glu Ala Gly Ile  
 35 40 45

Glu Phe Asp Gln Ala Tyr Thr Ser Val Leu Lys Arg Ala Ile Lys Thr  
 50 55 60

Thr Asn Leu Ala Leu Glu Ala Ser Asp Gln Leu Trp Val Pro Val Glu  
 65 70 75 80

Lys Ser Trp Arg Leu Asn Glu Arg His Tyr Gly Gly Leu Thr Gly Lys  
 85 90 95

Asn Lys Ala Glu Ala Ala Glu Gln Phe Gly Asp Glu Gln Val His Ile  
 100 105 110

Trp Arg Arg Ser Tyr Asp Val Leu Pro Pro Asn Met Asp Arg Asp Asp  
 115 120 125

Glu His Ser Ala His Thr Asp Arg Arg Tyr Ala Ser Leu Asp Asp Ser  
 130 135 140

Val Ile Pro Asp Ala Glu Asn Leu Lys Val Thr Leu Glu Arg Ala Leu  
 145 150 155 160

Pro Phe Trp Glu Asp Lys Ile Ala Pro Ala Leu Lys Asp Gly Lys Asn  
 165 170 175

Val Phe Val Gly Ala His Gly Asn Ser Ile Arg Ala Leu Val Lys His  
 180 185 190

Ile Lys Gly Leu Ser Asp Asp Glu Ile Met Asp Val Glu Ile Pro Asn  
 195 200 205

Phe Pro Pro Leu Val Phe Glu Phe Asp Glu Lys Leu Asn Val Val Ser  
 210 215 220

Glu Tyr Tyr Leu Gly Lys  
 225 230

<210> 708  
 <211> 179  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 708

Met Ser Leu Lys Asp Arg Phe Asp Arg Phe Ile Asp Tyr Phe Thr Glu  
 1 5 10 15

Asp Glu Asp Ser Ser Leu Pro Tyr Glu Lys Arg Asp Glu Pro Val Phe  
 20 25 30

Thr Ser Val Asn Ser Ser Gln Glu Pro Ala Leu Pro Met Asn Gln Pro  
 35 40 45

Ser Gln Ser Ala Gly Thr Lys Glu Asn Asn Ile Thr Arg Leu His Ala  
 50 55 60

Arg Gln Gln Glu Leu Ala Asn Gln Ser Gln Arg Ala Thr Asp Lys Val  
 65 70 75 80

Ile Ile Asp Val Arg Tyr Pro Arg Lys Tyr Glu Asp Ala Thr Glu Ile  
 85 90 95

Val Asp Leu Leu Ala Gly Asn Glu Ser Ile Leu Ile Asp Phe Gln Tyr  
 100 105 110

Met Thr Glu Val Gln Ala Arg Arg Cys Leu Asp Tyr Leu Asp Gly Ala  
 115 120 125

Cys His Val Leu Ala Gly Asn Leu Lys Lys Val Ala Ser Thr Met Tyr  
 130 135 140

Leu Leu Thr Pro Val Asn Val Ile Val Asn Val Glu Asp Ile Arg Leu  
 145 150 155 160

Pro Asp Glu Asp Gln Gln Gly Glu Phe Gly Phe Asp Met Lys Arg Asn  
 165 170 175

Arg Val Arg

<210> 709

<211> 457

<212> PRT

<213> Streptococcus pneumoniae

<400> 709

Met Ala Arg Glu Gly Phe Phe Thr Gly Leu Asp Ile Gly Thr Ser Ser  
 1 5 10 15

Val Lys Val Leu Val Ala Glu Gln Arg Asn Gly Glu Leu Asn Val Ile  
 20 25 30

Gly Val Ser Asn Ala Lys Ser Lys Gly Val Lys Asp Gly Ile Ile Val  
 35 40 45

Asp Ile Asp Ala Ala Ala Thr Ala Ile Lys Ser Ala Ile Ser Gln Ala  
 50 55 60

Glu Glu Lys Ala Gly Ile Ser Ile Lys Ser Val Asn Val Gly Leu Pro  
 65 70 75 80

Gly Asn Leu Leu Gln Val Glu Pro Thr Gln Gly Met Ile Pro Val Thr  
 85 90 95

Ser Asp Thr Lys Glu Ile Thr Asp Gln Asp Val Glu Asn Val Val Lys  
 100 105 110

Ser Ala Leu Thr Lys Ser Met Thr Pro Asp Arg Glu Val Ile Thr Phe  
 115 120 125

Ile Pro Glu Glu Phe Ile Val Asp Gly Phe Gln Gly Ile Arg Asp Pro  
 130 135 140

Arg Gly Met Met Gly Val Arg Leu Glu Met Arg Gly Leu Leu Tyr Thr  
 145 150 155 160

Gly Pro Arg Thr Ile Leu His Asn Leu Arg Lys Thr Val Glu Arg Ala  
 165 170 175

Gly Val Gln Val Glu Asn Val Ile Ile Ser Pro Leu Ala Met Val Gln  
 180 185 190

Ser Val Leu Asn Glu Gly Glu Arg Glu Phe Gly Ala Thr Val Ile Asp  
 195 200 205

Met Gly Ala Gly Gln Thr Thr Val Ala Thr Ile Arg Asn Gln Glu Leu  
 210 215 220

Gln Phe Thr His Ile Leu Gln Glu Gly Gly Asp Tyr Val Thr Lys Asp  
 225 230 235 240

Ile Ser Lys Val Leu Lys Thr Ser Arg Lys Leu Ala Glu Gly Leu Lys  
 245 250 255

Leu Asn Tyr Gly Glu Ala Tyr Pro Pro Leu Ala Ser Lys Glu Thr Phe  
 260 265 270

Gln Val Glu Val Ile Gly Glu Val Glu Ala Val Glu Val Thr Glu Ala  
 275 280 285

Tyr Leu Ser Glu Ile Ile Ser Ala Arg Ile Lys His Ile Leu Glu Gln  
 290 295 300

Ile Lys Gln Glu Leu Asp Arg Arg Arg Leu Leu Asp Leu Pro Gly Gly  
 305 310 315 320

Ile Val Leu Ile Gly Gly Asn Ala Ile Leu Pro Gly Met Val Glu Leu  
 325 330 335

Ala Gln Glu Val Phe Gly Val Arg Val Lys Leu Tyr Val Pro Asn Gln  
 340 345 350

Val Gly Ile Arg Asn Pro Ala Phe Ala His Val Ile Ser Leu Ser Glu  
 355 360 365

Phe Ala Gly Gln Leu Thr Glu Val Asn Leu Leu Ala Gln Gly Ala Ile  
 370 375 380

Lys Gly Glu Asn Asp Leu Ser His Gln Pro Ile Ser Phe Gly Gly Met  
 385 390 395 400

Leu Gln Lys Thr Ala Gln Phe Val Gln Ser Thr Pro Val Gln Pro Ala  
 405 410 415

Pro Ala Pro Glu Val Glu Pro Val Ala Pro Thr Glu Pro Met Ala Asp  
 420 425 430

Phe Gln Gln Ala Ser Gln Asn Lys Pro Lys Leu Ala Asp Arg Phe Arg  
 435 440 445

Gly Leu Ile Gly Ser Met Phe Asp Glu  
 450 455

<210> 710

<211> 685

<212> PRT

<213> Streptococcus pneumoniae

<400> 710

Met Arg Leu Ile Cys Met Arg Lys Phe Asn Ser His Ser Ile Pro Ile  
 1 5 10 15

Arg Leu Asn Leu Leu Phe Ser Ile Val Ile Leu Leu Phe Met Thr Ile  
 20 25 30

Ile Gly Arg Leu Leu Tyr Met Gln Val Leu Asn Lys Asp Phe Tyr Glu  
 35 40 45

Lys Lys Leu Ala Ser Ala Ser Gln Thr Lys Ile Thr Ser Ser Ser Ala  
 50 55 60

Arg Gly Glu Ile Tyr Asp Ala Ser Gly Lys Pro Leu Val Glu Asn Thr  
 65 70 75 80

Leu Lys Gln Val Val Ser Phe Thr Arg Ser Asn Lys Met Thr Ala Thr  
 85 90 95



Asp Leu Lys Glu Thr Ala Lys Lys Leu Leu Thr Tyr Val Ser Ile Ser  
 100 105 110

Ser Pro Asn Leu Thr Glu Arg Gln Leu Ala Asp Tyr Tyr Leu Ala Asp  
 115 120 125

Pro Glu Ile Tyr Lys Lys Ile Val Glu Ala Leu Pro Ser Glu Lys Arg  
 130 135 140

Leu Asp Ser Asp Gly Asn Arg Leu Ser Glu Ser Glu Leu Tyr Asn Asn  
 145 150 155 160

Ala Val Asp Ser Val Gln Thr Ser Gln Leu Asn Tyr Thr Glu Asp Glu  
 165 170 175

Lys Lys Glu Ile Tyr Leu Phe Ser Gln Leu Asn Ala Val Gly Asn Phe  
 180 185 190

Ala Thr Gly Thr Ile Ala Thr Asp Pro Leu Asn Asp Ser Gln Val Ala  
 195 200 205

Val Ile Ala Ser Ile Ser Lys Glu Met Pro Gly Ile Ser Ile Ser Thr  
 210 215 220

Ser Trp Asp Arg Lys Val Leu Glu Thr Ser Leu Ser Ser Ile Val Gly  
 225 230 235 240

Ser Val Ser Ser Glu Lys Ala Gly Leu Pro Ala Glu Glu Ala Glu Ala  
 245 250 255

Tyr Leu Lys Lys Gly Tyr Ser Leu Asn Asp Arg Val Gly Thr Ser Tyr  
 260 265 270

Leu Glu Lys Gln Tyr Glu Glu Thr Leu Gln Gly Lys Arg Ser Val Lys  
 275 280 285

Glu Ile His Leu Asp Lys Tyr Gly Asn Met Glu Ser Val Asp Thr Ile  
 290 295 300

Glu Glu Gly Ser Lys Gly Asn Asn Ile Lys Leu Thr Ile Asp Leu Ala  
 305 310 315 320

Phe Gln Asp Ser Val Asp Ala Leu Leu Lys Ser Tyr Phe Asn Ser Glu  
                                   325                                  330                                  335

Leu Glu Asn Gly Gly Ala Lys Tyr Ser Glu Gly Val Tyr Ala Val Ala  
                                   340                                  345                                  350

Leu Asn Pro Lys Thr Gly Ala Val Leu Ser Met Ser Gly Ile Lys His  
                                   355                                  360                                  365

Asp Leu Lys Thr Gly Glu Leu Thr Pro Asp Ser Leu Gly Thr Val Thr  
                                   370                                  375                                  380

Asn Val Phe Val Pro Gly Ser Val Val Lys Ala Ala Thr Ile Ser Ser  
                                   385                                  390                                  395                                  400

Gly Trp Glu Asn Gly Val Leu Ser Gly Asn Gln Thr Leu Thr Asp Gln  
                                   405                                  410                                  415

Ser Ile Val Phe Gln Gly Ser Ala Pro Ile Asn Ser Trp Tyr Thr Gln  
                                   420                                  425                                  430

Ala Tyr Gly Ser Phe Pro Ile Thr Ala Val Gln Ala Leu Glu Tyr Ser  
                                   435                                  440                                  445

Ser Asn Thr Tyr Met Val Gln Thr Ala Leu Gly Leu Met Gly Gln Thr  
                                   450                                  455                                  460

Tyr Gln Pro Asn Met Phe Val Gly Thr Ser Asn Leu Glu Ser Ala Met  
                                   465                                  470                                  475                                  480

Glu Lys Leu Arg Ser Thr Phe Gly Glu Tyr Gly Leu Gly Thr Ala Thr  
                                   485                                  490                                  495

Gly Ile Asp Leu Pro Asp Glu Ser Thr Gly Phe Val Pro Lys Glu Tyr  
                                   500                                  505                                  510

Ser Phe Ala Asn Tyr Ile Thr Asn Ala Phe Gly Gln Phe Asp Asn Tyr  
                                   515                                  520                                  525

Thr Pro Met Gln Leu Ala Gln Tyr Val Ala Thr Ile Ala Asn Asn Gly

530                      535                      540  
 Val Arg Val Ala Pro Arg Ile Val Glu Gly Ile Tyr Gly Asn Asn Asp  
 545                      550                      555                      560  
 Lys Gly Gly Leu Gly Asp Leu Ile Gln Gln Leu Gln Pro Thr Glu Met  
                     565                      570                      575  
 Asn Lys Val Asn Ile Ser Asp Ser Asp Met Ser Ile Leu His Gln Gly  
                     580                      585                      590  
 Phe Tyr Gln Val Ala His Gly Thr Ser Gly Leu Thr Thr Gly Arg Ala  
                     595                      600                      605  
 Phe Ser Asn Gly Ala Leu Val Ser Ile Ser Gly Lys Thr Gly Thr Ala  
                     610                      615                      620  
 Glu Ser Tyr Val Ala Asp Gly Gln Gln Ala Thr Asn Thr Asn Ala Val  
                     625                      630                      635                      640  
 Ala Tyr Ala Pro Ser Asp Asn Pro Gln Ile Ala Val Ala Val Val Phe  
                     645                      650                      655  
 Pro His Asn Thr Asn Leu Thr Asn Gly Val Gly Pro Ser Ile Ala Arg  
                     660                      665                      670  
 Asp Ile Ile Asn Leu Tyr Gln Lys Tyr His Pro Met Asn  
                     675                      680                      685  
  
 <210> 711  
 <211> 301  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 711  
 Met Ser Glu Leu Ile Ser Val Val Val Pro Ile Tyr Asn Thr Gly Lys  
 1                      5                      10                      15  
 Tyr Leu Val Glu Cys Val Glu His Ile Leu Lys Gln Thr Tyr Gln Asn  
                     20                      25                      30  
 Ile Glu Ile Ile Leu Val Asp Asp Gly Ser Thr Asp Asn Ser Gly Glu

35	40	45													
Ile	Cys	Asp	Ala	Phe	Met	Met	Gln	Asp	Asn	Arg	Val	Arg	Val	Leu	His
50						55					60				
Gln	Glu	Asn	Lys	Gly	Gly	Ala	Ala	Gln	Ala	Lys	Asn	Met	Gly	Ile	Ser
65					70					75				80	
Val	Ala	Lys	Gly	Glu	Tyr	Ile	Thr	Ile	Val	Asp	Ser	Asp	Asp	Ile	Val
				85					90					95	
Lys	Glu	Asn	Met	Ile	Glu	Thr	Leu	Tyr	Gln	Gln	Val	Gln	Glu	Lys	Asp
			100					105						110	
Ala	Asp	Val	Val	Ile	Gly	Asn	Tyr	Tyr	Asn	Tyr	Asp	Glu	Ser	Asp	Gly
		115					120					125			
Asn	Phe	Tyr	Phe	Tyr	Val	Thr	Gly	Gln	Asp	Phe	Cys	Val	Glu	Glu	Leu
	130					135					140				
Ala	Ile	Gln	Glu	Ile	Met	Asn	Arg	Gln	Ala	Gly	Asp	Trp	Lys	Phe	Asn
145					150					155					160
Ser	Ser	Ala	Phe	Ile	Leu	Pro	Thr	Phe	Lys	Leu	Ile	Lys	Lys	Glu	Leu
				165					170					175	
Phe	Asn	Glu	Val	His	Phe	Ser	Asn	Gly	Arg	Arg	Phe	Asp	Asp	Glu	Ala
			180					185					190		
Thr	Met	His	Arg	Phe	Tyr	Leu	Leu	Ala	Ser	Lys	Ile	Val	Phe	Ile	Asn
	195					200						205			
Asp	Asn	Leu	Tyr	Leu	Tyr	Arg	Arg	Arg	Ser	Gly	Ser	Ile	Met	Arg	Thr
	210					215					220				
Glu	Phe	Asp	Leu	Ser	Trp	Ala	Arg	Asp	Ile	Val	Glu	Val	Phe	Ser	Lys
225					230					235					240
Lys	Ile	Ser	Asp	Cys	Val	Leu	Ala	Gly	Leu	Asp	Val	Ser	Val	Leu	Arg
				245					250					255	

Ile Arg Phe Val Asn Leu Leu Lys Asp Tyr Lys Gln Thr Leu Glu Tyr  
 260 265 270

His Gln Leu Thr Asp Thr Glu Glu Tyr Lys Asp Ile Cys Phe Arg Leu  
 275 280 285

Lys Leu Phe Phe Asp Ala Glu Gln Arg Asn Gly Lys Ser  
 290 295 300

<210> 712

<211> 104

<212> PRT

<213> Streptococcus pneumoniae

<400> 712

Met Ala Lys Ala Ile Thr Asp Ala Thr Phe Glu Gln Glu Thr Lys Asp  
 1 5 10 15

Gly Leu Val Leu Val Asp Phe Trp Ala Thr Trp Cys Gly Pro Cys Arg  
 20 25 30

Met Gln Gly Pro Ile Leu Asp Lys Leu Ser Glu Glu Leu Ser Glu Asp  
 35 40 45

Val Leu Lys Ile Val Lys Met Asp Val Asp Glu Asn Pro Asn Thr Ala  
 50 55 60

Arg Ala Phe Gly Ile Met Ser Ile Pro Thr Leu Leu Phe Lys Lys Asp  
 65 70 75 80

Gly Gln Val Val Lys Gln Val Ala Gly Val His Thr Ala Glu Gln Ile  
 85 90 95

Lys Ala Ile Ile Ala Glu Leu Ser  
 100

<210> 713

<211> 202

<212> PRT

<213> Streptococcus pneumoniae

<400> 713

Met Ser Asn Glu Lys Asn Thr Asn Thr Asn Val Glu Lys Lys Asp Ala

[illegible]

&lt;400&gt; 714

Met Gln Asn Lys Gln Glu Gln Trp Thr Val Leu Lys Arg Leu Met Ser  
 1 5 10 15

Tyr Leu Lys Pro Tyr Gly Leu Leu Thr Phe Leu Ala Leu Ser Phe Leu  
 20 25 30

Leu Ala Thr Thr Val Ile Lys Ser Val Ile Pro Leu Val Ala Ser His  
 35 40 45

Phe Ile Asp Gln Tyr Leu Ser Asn Leu Asn Gln Leu Ala Val Thr Val  
 50 55 60

Leu Leu Val Tyr Tyr Gly Leu Tyr Ile Leu Gln Thr Val Val Gln Tyr  
 65 70 75 80

Val Gly Asn Leu Leu Phe Ala Arg Val Ser Tyr Ser Ile Val Arg Asp  
 85 90 95

Ile Arg Arg Asp Ala Phe Ala Asn Met Glu Lys Leu Gly Met Ser Tyr  
 100 105 110

Phe Asp Lys Thr Pro Ala Gly Ser Ile Val Ser Arg Leu Thr Asn Asp  
 115 120 125

Thr Glu Thr Ile Ser Asp Met Phe Ser Gly Ile Leu Ser Ser Phe Ile  
 130 135 140

Ser Ala Val Phe Ile Phe Leu Thr Thr Leu Tyr Thr Met Leu Val Leu  
 145 150 155 160

Asp Phe Arg Leu Thr Ala Leu Val Leu Leu Phe Leu Pro Leu Ile Phe  
 165 170 175

Leu Leu Val Asn Leu Tyr Arg Lys Lys Ser Val Lys Ile Ile Glu Lys  
 180 185 190

Thr Arg Ser Leu Leu Ser Asp Ile Asn Ser Lys Leu Ala Glu Asn Ile  
 195 200 205

Glu Gly Ile Arg Ile Ile Gln Ala Phe Asn Gln Glu Lys Arg Leu Gln  
 210 215 220

Ala Glu Phe Asp Glu Ile Asn Gln Glu His Leu Val Tyr Ala Asn Arg  
 225 230 235 240

Ser Val Ala Leu Asp Ala Leu Phe Leu Arg Pro Ala Met Ser Leu Leu  
 245 250 255

Lys Leu Leu Gly Tyr Ala Val Leu Met Ala Tyr Phe Gly Tyr Arg Gly  
 260 265 270

Phe Ser Ile Gly Ile Thr Val Gly Thr Met Tyr Ala Phe Ile Gln Tyr  
 275 280 285

Ile Asn Arg Leu Phe Asp Pro Leu Ile Glu Val Thr Gln Asn Phe Ser  
 290 295 300

Thr Leu Gln Thr Ala Met Val Ser Ala Gly Arg Val Phe Ala Leu Ile  
 305 310 315 320

Asp Glu Arg Thr Tyr Glu Pro Leu Gln Glu Asn Gly Gln Ala Lys Val  
 325 330 335

Gln Glu Gly Asn Ile Arg Phe Glu His Val Cys Phe Ser Tyr Asp Gly  
 340 345 350

Lys His Pro Ile Leu Asp Asp Ile Ser Phe Ser Val Asn Lys Gly Glu  
 355 360 365

Thr Ile Ala Phe Val Gly His Thr Gly Ser Gly Lys Ser Ser Ile Ile  
 370 375 380

Asn Val Leu Met Arg Phe Tyr Glu Phe Gln Ser Gly Arg Val Leu Leu  
 385 390 395 400

Asp Asp Val Asp Ile Arg Asp Phe Ser Gln Glu Glu Leu Arg Lys Asn  
 405 410 415

Ile Gly Leu Val Leu Gln Glu Pro Phe Leu Tyr His Gly Thr Ile Lys  
 420 425 430



Ser Asn Ile Ala Met Tyr Gln Glu Thr Ser Asp Glu Gln Val Gln Ala  
 435 440 445

Ala Ala Ala Phe Val Asp Ala Asp Ser Phe Ile Gln Glu Leu Pro Gln  
 450 455 460

Gly Tyr Asp Ser Pro Val Ser Glu Arg Gly Ser Ser Phe Ser Thr Gly  
 465 470 475 480

Gln Arg Gln Leu Leu Ala Phe Ala Arg Thr Val Ala Ser Gln Pro Lys  
 485 490 495

Ile Leu Ile Leu Asp Glu Ala Thr Ala Asn Ile Asp Ser Glu Thr Glu  
 500 505 510

Ser Leu Val Gln Ala Ser Leu Ala Lys Met Arg Gln Gly Arg Thr Thr  
 515 520 525

Ile Ala Ile Ala His Arg Leu Ser Thr Ile Gln Asp Ala Asn Cys Ile  
 530 535 540

Tyr Val Leu Asp Lys Gly Arg Ile Ile Glu Ser Gly Thr His Glu Glu  
 545 550 555 560

Leu Leu Ala Leu Gly Gly Thr Tyr His Lys Met Tyr Ser Leu Gln Ala  
 565 570 575

Gly Ala Met Ala Asp Thr Leu  
 580

<210> 715

<211> 153

<212> PRT

<213> Streptococcus pneumoniae

<400> 715

Met Lys Thr Lys Gln Leu Val Ala Ser Glu Glu Val Tyr Asp Phe Leu  
 1 5 10 15

Lys Val Ile Trp Pro Asp Tyr Glu Thr Glu Ser Arg Tyr Asp Asn Leu  
 20 25 30

Ser Leu Ile Val Cys Thr Leu Ser Asp Pro Asp Cys Val Arg Trp Leu  
 35 40 45

Ser Glu Asn Met Lys Phe Gly Asp Glu Lys Gln Leu Ala Leu Met Lys  
 50 55 60

Glu Lys Tyr Gly Trp Glu Val Gly Asp Lys Leu Pro Glu Trp Leu His  
 65 70 75 80

Ser Ser Tyr His Arg Leu Leu Leu Ile Gly Glu Leu Leu Glu Ser Asn  
 85 90 95

Leu Lys Leu Lys Lys Tyr Thr Val Glu Ile Thr Glu Thr Leu Ser Arg  
 100 105 110

Leu Val Ser Ile Glu Ala Glu Asn Pro Asp Glu Ala Glu Arg Leu Val  
 115 120 125

Arg Glu Lys Tyr Lys Ser Cys Glu Ile Val Leu Asp Ala Asp Asp Phe  
 130 135 140

Gln Asp Tyr Asp Thr Ser Ile Tyr Glu  
 145 150

<210> 716  
 <211> 336  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 716

Met Ala Gly Lys Arg Asp Ser Cys Gly Ala Cys Arg Ile Met Thr Asn  
 1 5 10 15

Lys Ile Tyr Glu Tyr Lys Asp Asp Gln Asp Trp Tyr Val Gly Ser Tyr  
 20 25 30

Ser Ile Phe Gly Gly Val Asn Ser Leu Ser Asp Tyr Lys Thr Asp Phe  
 35 40 45

Pro Leu Phe Glu Phe Ser Lys Ile Phe Gly Asp Glu Glu Tyr Gly Phe  
 50 55 60

Pro Leu Ser Val Thr Val Leu Arg Tyr Gly Ser Ile Tyr Arg Leu Phe  
65 70 75 80

Ser Phe Val Val Asp Met Leu Asn Gln Glu Met Gly Arg Asn Leu Glu  
85 90 95

Val Ile Gln Arg His Gly Ala Leu Leu Leu Val Glu Asn Gly Gln Leu  
100 105 110

Leu Tyr Val Glu Leu Pro Lys Glu Gly Val Asn Val His Asp Phe Phe  
115 120 125

Glu Thr Ser Lys Val Arg Glu Thr Leu Leu Ile Ala Thr Arg Asn Glu  
130 135 140

Gly Lys Thr Lys Glu Phe Arg Ala Ile Phe Asp Lys Leu Gly Tyr Asp  
145 150 155 160

Val Glu Asn Leu Asn Asp Tyr Pro Asp Leu Pro Glu Val Ala Glu Thr  
165 170 175

Gly Met Thr Phe Glu Glu Asn Ala Arg Leu Lys Ala Glu Thr Ile Ser  
180 185 190

Gln Leu Thr Gly Lys Met Val Leu Ala Asp Asp Ser Gly Leu Lys Val  
195 200 205

Asp Val Leu Gly Gly Leu Pro Gly Val Trp Ser Ala Arg Phe Ala Gly  
210 215 220

Val Gly Ala Thr Asp Arg Glu Asn Asn Ala Lys Leu Leu His Glu Leu  
225 230 235 240

Ala Met Val Phe Glu Leu Lys Asp Arg Ser Ala Gln Phe His Thr Thr  
245 250 255

Leu Val Val Ala Ser Pro Asn Lys Glu Ser Leu Val Val Glu Ala Asp  
260 265 270

Trp Ser Gly Tyr Ile Asn Phe Glu Pro Lys Gly Glu Asn Gly Phe Gly  
275 280 285

Tyr Asp Pro Leu Phe Leu Val Gly Glu Thr Gly Glu Ser Ser Ala Glu  
 290 295 300

Leu Thr Leu Glu Glu Lys Asn Ser Gln Ser His Arg Ala Leu Ala Val  
 305 310 315 320

Lys Lys Leu Leu Glu Val Phe Pro Ser Trp Gln Ser Lys Pro Ser Leu  
 325 330 335

<210> 717

<211> 100

<212> PRT

<213> Streptococcus pneumoniae

<400> 717

Met Ala Ser Leu Trp Tyr Asn Glu Arg Asp Ser Lys Arg Asn Arg Arg  
 1 5 10 15

Lys Met Met Asp Leu Leu Leu Ala Ile Val Leu Ile Val Leu Ala Phe  
 20 25 30

Leu Gly Gly Ala Leu Gly Gly Met Tyr Leu Val Arg Lys Gln Ile Glu  
 35 40 45

Lys Glu Phe Ala Asp Asn Pro Arg Leu Asn Ala Glu Ala Val Arg Thr  
 50 55 60

Leu Leu Ser Ala Asn Gly Gln Lys Pro Ser Glu Ala Lys Val Gln Gln  
 65 70 75 80

Val Tyr His Gln Ile Ile Arg Gln Gln Lys Ala Ala Leu Ala Asn Asn  
 85 90 95

Lys Lys Lys Lys  
 100

<210> 718

<211> 94

<212> PRT

<213> Streptococcus pneumoniae

<400> 718

Met Leu Lys Pro Leu Gly Asp Arg Val Val Leu Lys Ile Glu Glu Lys  
1 5 10 15

Glu Gln Thr Val Gly Gly Phe Val Leu Ala Gly Ser Ala Gln Glu Lys  
20 25 30

Thr Lys Thr Ala Gln Val Val Ala Thr Gly Gln Gly Val Arg Thr Leu  
35 40 45

Asn Gly Asp Leu Val Ala Pro Ser Val Lys Thr Gly Asp Arg Val Leu  
50 55 60

Val Glu Ala His Ala Gly Leu Asp Val Lys Asp Gly Asp Glu Lys Tyr  
65 70 75 80

Ile Ile Val Gly Glu Ala Asn Ile Leu Ala Ile Ile Glu Glu  
85 90

<210> 719

<211> 158

<212> PRT

<213> Streptococcus pneumoniae

<400> 719

Met Lys Gly Val Thr Asn Met Thr Pro Glu Glu Met Tyr Leu Thr Glu  
1 5 10 15

Arg Leu Asp Val Gln Ile Ala His Phe Leu Lys Lys Ser Val Gln His  
20 25 30

Arg Arg Arg Tyr Lys Val Leu Lys Ile Thr Glu Ile Val Ala Gly Phe  
35 40 45

Leu Ile Ala Val Phe Cys Ala Ile Pro Met Pro Gly Asp Arg Tyr Arg  
50 55 60

Leu Ile Ser Val Ala Leu Ser Ser Leu Gly Leu Leu Cys Glu Gly Ile  
65 70 75 80

Ile Asn Leu Tyr Asn Ala Lys Glu Asn Trp Ile Ser Tyr Gln Lys Thr  
85 90 95

Ala Gln Leu Leu Glu Lys Glu Lys Phe Leu Tyr Gln Cys Gln Thr Glu  
 100 105 110

Lys Tyr Ala Gly Lys Thr Lys Ala Phe Ala Leu Phe Val Lys Thr Cys  
 115 120 125

Glu Gly Leu Ile Ser Glu Glu Ile Asn Gln Trp Glu Ser Ile Gln Ser  
 130 135 140

Lys Glu Val Ala Ala Ser Ala Asp Ala Pro Val Lys Lys Glu  
 145 150 155

<210> 720

<211> 388

<212> PRT

<213> Streptococcus pneumoniae

<400> 720

Met Ala Lys Lys Pro Lys Lys Leu Glu Glu Ile Ser Lys Lys Phe Gly  
 1 5 10 15

Ala Glu Arg Glu Lys Ala Leu Asn Asp Ala Leu Lys Leu Ile Glu Lys  
 20 25 30

Asp Phe Gly Lys Gly Ser Ile Met Arg Leu Gly Glu Arg Ala Glu Gln  
 35 40 45

Lys Val Gln Val Met Ser Ser Gly Ser Leu Ala Leu Asp Ile Ala Leu  
 50 55 60

Gly Ser Gly Gly Tyr Pro Lys Gly Arg Ile Ile Glu Ile Tyr Gly Pro  
 65 70 75 80

Glu Ser Ser Gly Lys Thr Thr Val Ala Leu His Ala Val Ala Gln Ala  
 85 90 95

Gln Lys Glu Gly Gly Ile Ala Ala Phe Ile Asp Ala Glu His Ala Leu  
 100 105 110

Asp Pro Ala Tyr Ala Ala Ala Leu Gly Val Asn Ile Asp Glu Leu Leu  
 115 120 125

Leu Ser Gln Pro Asp Ser Gly Glu Gln Gly Leu Glu Ile Ala Gly Lys  
 130 135 140

Leu Ile Asp Ser Gly Ala Val Asp Leu Val Val Val Asp Ser Val Ala  
 145 150 155 160

Ala Leu Val Pro Arg Ala Glu Ile Asp Gly Asp Ile Gly Asp Ser His  
 165 170 175

Val Gly Leu Gln Ala Arg Met Met Ser Gln Ala Met Arg Lys Leu Gly  
 180 185 190

Ala Ser Ile Asn Lys Thr Lys Thr Ile Ala Ile Phe Ile Asn Gln Leu  
 195 200 205

Arg Glu Lys Val Gly Val Met Phe Gly Asn Pro Glu Thr Thr Pro Gly  
 210 215 220

Gly Arg Ala Leu Lys Phe Tyr Ala Ser Val Arg Leu Asp Val Arg Gly  
 225 230 235 240

Asn Thr Gln Ile Lys Gly Thr Gly Asp Gln Lys Glu Thr Asn Val Gly  
 245 250 255

Lys Glu Thr Lys Ile Lys Val Val Lys Asn Lys Val Ala Pro Pro Phe  
 260 265 270

Lys Glu Ala Val Val Glu Ile Met Tyr Gly Glu Gly Ile Ser Lys Thr  
 275 280 285

Gly Glu Leu Leu Lys Ile Ala Ser Asp Leu Asp Ile Ile Lys Lys Ala  
 290 295 300

Gly Ala Trp Tyr Ser Tyr Lys Asp Glu Lys Ile Gly Gln Gly Ser Glu  
 305 310 315 320

Asn Ala Lys Lys Tyr Leu Ala Glu His Pro Glu Ile Phe Asp Glu Ile  
 325 330 335

Asp Lys Gln Val Arg Ser Lys Phe Gly Leu Ile Asp Gly Glu Glu Val  
 340 345 350

Ser Glu Gln Asp Thr Glu Asn Lys Lys Asp Glu Pro Lys Lys Glu Glu  
 355 360 365

Ala Val Asn Glu Glu Val Pro Leu Asp Leu Gly Asp Glu Leu Glu Ile  
 370 375 380

Glu Ile Glu Glu  
 385

<210> 721  
 <211> 1225  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 721

Met Val Asp Val Asn Arg Phe Lys Ser Met Gln Ile Thr Leu Ala Ser  
 1 5 10 15

Pro Ser Lys Val Arg Ser Trp Ser Tyr Gly Glu Val Lys Lys Pro Glu  
 20 25 30

Thr Ile Asn Tyr Arg Thr Leu Lys Pro Glu Arg Glu Gly Leu Phe Asp  
 35 40 45

Glu Val Ile Phe Gly Pro Thr Lys Asp Trp Glu Cys Ala Cys Gly Lys  
 50 55 60

Tyr Lys Arg Ile Arg Tyr Arg Gly Ile Val Cys Asp Arg Cys Gly Val  
 65 70 75 80

Glu Val Thr Arg Thr Lys Val Arg Arg Glu Arg Met Gly His Ile Glu  
 85 90 95

Leu Lys Ala Pro Val Ser His Ile Trp Tyr Phe Lys Gly Ile Pro Ser  
 100 105 110

Arg Met Gly Leu Thr Leu Asp Met Ser Pro Arg Ala Leu Glu Glu Val  
 115 120 125

Ile Tyr Phe Ala Ala Tyr Val Val Ile Asp Pro Lys Asp Thr Pro Leu  
 130 135 140



Glu His Lys Ser Ile Met Thr Glu Arg Glu Tyr Arg Glu Arg Leu Arg  
 145 150 155 160

Glu Tyr Gly Tyr Gly Ser Phe Val Ala Lys Met Gly Ala Glu Ala Ile  
 165 170 175

Gln Asp Leu Leu Lys Gln Val Asp Leu Glu Lys Glu Ile Ala Glu Leu  
 180 185 190

Lys Glu Glu Leu Lys Thr Ala Thr Gly Gln Lys Arg Val Lys Ala Ile  
 195 200 205

Arg Arg Leu Asp Val Leu Asp Ala Phe Tyr Lys Ser Gly Asn Lys Pro  
 210 215 220

Glu Trp Met Ile Leu Asn Ile Leu Pro Val Ile Pro Pro Asp Leu Arg  
 225 230 235 240

Pro Met Leu Gln Leu Asp Gly Gly Arg Phe Ala Ser Ser Asp Leu Asn  
 245 250 255

Asp Leu Tyr Arg Arg Val Ile Asn Arg Asn Asn Arg Leu Ala Arg Leu  
 260 265 270

Leu Glu Leu Asn Ala Pro Gly Ile Ile Val Gln Asn Glu Lys Arg Met  
 275 280 285

Leu Gln Glu Ala Val Asp Ala Leu Ile Asp Asn Gly Arg Arg Gly Arg  
 290 295 300

Pro Ile Thr Gly Pro Gly Ser Arg Pro Leu Lys Ser Leu Ser His Met  
 305 310 315 320

Leu Lys Gly Lys Gln Gly Arg Phe Arg Gln Asn Leu Leu Gly Lys Arg  
 325 330 335

Val Asp Phe Ser Gly Arg Ser Val Ile Ala Val Gly Pro Thr Leu Lys  
 340 345 350

Met Tyr Gln Cys Gly Val Pro Arg Glu Met Ala Ile Glu Leu Phe Lys

355	360	365
Pro Phe Val Met Arg Glu Ile Val Ala Arg Asp Ile Val Gln Asn Val		
370	375	380
Lys Ala Ala Lys Arg Leu Val Glu Arg Gly Asp Glu Arg Ile Trp Asp		
385	390	395
Ile Leu Glu Glu Val Ile Lys Glu His Pro Val Leu Leu Asn Arg Ala		
405	410	415
Pro Thr Leu His Arg Leu Gly Ile Gln Ala Phe Glu Pro Val Leu Ile		
420	425	430
Asp Gly Lys Ala Leu Arg Leu His Pro Leu Val Cys Glu Ala Tyr Asn		
435	440	445
Ala Asp Phe Asp Gly Asp Gln Met Ala Ile His Val Pro Leu Ser Glu		
450	455	460
Glu Ala Gln Ala Glu Ala Arg Ile Leu Met Leu Ala Ala Glu His Ile		
465	470	475
Leu Asn Pro Lys Asp Gly Lys Pro Val Val Thr Pro Ser Gln Asp Met		
485	490	495
Val Leu Gly Asn Tyr Tyr Leu Thr Met Glu Glu Ala Gly Arg Glu Gly		
500	505	510
Glu Gly Met Val Phe Lys Asp Arg Asp Glu Ala Val Met Ala Tyr Arg		
515	520	525
Asn Gly Tyr Val His Leu His Ser Arg Val Gly Ile Ala Thr Asp Ser		
530	535	540
Leu Asn Lys Pro Trp Thr Glu Glu Gln Arg His Lys Val Leu Leu Thr		
545	550	555
Thr Val Gly Lys Ile Leu Phe Asn Asp Ile Met Pro Glu Gly Leu Pro		
565	570	575

Tyr Leu Gln Glu Pro Asn Asn Ala Asn Leu Thr Glu Gly Val Pro Ala  
 580 585 590

Lys Tyr Phe Leu Pro Leu Gly Gly Asp Ile Lys Glu Ala Ile Ser Asn  
 595 600 605

Leu Glu Leu Asn Pro Pro Phe Lys Lys Lys Asn Leu Gly Asn Ile Ile  
 610 615 620

Ala Glu Ile Phe Lys Arg Phe Arg Thr Thr Glu Thr Ser Ala Leu Leu  
 625 630 635 640

Asp Arg Met Lys Asn Leu Gly Tyr His His Ser Thr Leu Ala Gly Leu  
 645 650 655

Thr Val Gly Ile Ala Asp Ile Pro Val Val Asp Asp Lys Ala Glu Ile  
 660 665 670

Ile Glu Glu Ser His Lys Arg Val Glu Gln Ile Thr Lys Gln Phe Arg  
 675 680 685

Arg Gly Met Ile Thr Asp Asp Glu Arg Tyr Asn Ala Val Thr Ala Glu  
 690 695 700

Trp Arg Ala Ala Arg Glu Lys Leu Glu Lys Arg Leu Ile Ala Asn Gln  
 705 710 715 720

Asp Pro Lys Asn Pro Ile Val Met Met Met Asp Ser Gly Ala Arg Gly  
 725 730 735

Asn Ile Ser Asn Phe Ser Gln Leu Ala Gly Met Arg Gly Leu Met Ala  
 740 745 750

Ala Pro Asn Gly Arg Ile Met Glu Leu Pro Ile Leu Ser Asn Phe Arg  
 755 760 765

Glu Gly Leu Ser Val Leu Glu Met Phe Phe Ser Thr His Gly Ala Arg  
 770 775 780

Lys Gly Met Thr Asp Thr Ala Leu Lys Thr Ala Asp Ser Gly Tyr Leu  
 785 790 795 800

Thr Arg Arg Leu Val Asp Val Ala Gln Asp Val Ile Ile Arg Glu Asp  
805 810 815

Asp Cys Gly Thr Asp Arg Gly Leu Leu Ile Arg Ser Ile Ala Glu Gly  
820 825 830

Lys Glu Met Ile Glu Ser Leu Glu Glu Arg Leu Asn Gly Arg Tyr Thr  
835 840 845

Lys Lys Thr Val Lys His Pro Glu Thr Gly Ala Val Ile Ile Gly Pro  
850 855 860

Asn Glu Leu Ile Thr Glu Asp Lys Ala Arg Glu Ile Val Asn Ala Gly  
865 870 875 880

Val Glu Glu Val Thr Ile Arg Ser Val Phe Thr Cys Asn Thr Arg His  
885 890 895

Gly Val Cys Arg His Cys Tyr Gly Ile Asn Leu Ala Thr Gly Asp Ala  
900 905 910

Val Glu Val Gly Glu Ala Val Gly Thr Ile Ala Ala Gln Ser Ile Gly  
915 920 925

Glu Pro Gly Thr Gln Leu Thr Met Arg Thr Phe His Thr Gly Gly Val  
930 935 940

Ala Ser Asn Thr Asp Ile Thr Gln Gly Leu Pro Arg Val Gln Glu Ile  
945 950 955 960

Phe Glu Ala Arg Asn Pro Lys Gly Glu Ala Val Ile Thr Glu Val Lys  
965 970 975

Gly Gln Val Thr Ala Ile Glu Glu Asp Ala Ser Thr Arg Thr Lys Lys  
980 985 990

Val Phe Val Lys Gly Glu Thr Gly Glu Gly Glu Tyr Val Val Pro Phe  
995 1000 1005

Thr Ala Arg Met Arg Val Glu Val Gly Gly Gln Val Ala Arg Gly  
1010 1015 1020

Ala Ala Leu Thr Glu Gly Ser Ile Gln Pro Lys Arg Leu Leu Ala  
 1025 1030 1035  
  
 Val Arg Asp Val Leu Ser Val Glu Thr Tyr Leu Leu Gly Glu Val  
 1040 1045 1050  
  
 Gln Lys Val Tyr Arg Ser Gln Gly Val Glu Ile Gly Asp Lys His  
 1055 1060 1065  
  
 Ile Glu Val Met Val Arg Gln Met Ile Arg Lys Val Arg Val Met  
 1070 1075 1080  
  
 Asp Pro Gly Asp Thr Asp Leu Leu Met Gly Thr Leu Met Asp Ile  
 1085 1090 1095  
  
 Asn Asp Phe Thr Asp Ala Asn Lys Asp Val Leu Ile Ala Gly Gly  
 1100 1105 1110  
  
 Val Pro Ala Thr Gly Arg Pro Val Leu Met Gly Ile Thr Lys Ala  
 1115 1120 1125  
  
 Ser Leu Glu Thr Asn Ser Phe Leu Ser Ala Ala Ser Phe Gln Glu  
 1130 1135 1140  
  
 Thr Thr Arg Val Leu Thr Asp Ala Ala Ile Arg Gly Lys Lys Asp  
 1145 1150 1155  
  
 His Leu Leu Gly Leu Lys Glu Asn Val Ile Ile Gly Lys Ile Ile  
 1160 1165 1170  
  
 Pro Ala Gly Thr Gly Met Ala Arg Tyr Arg Asn Leu Glu Pro His  
 1175 1180 1185  
  
 Ala Val Asn Glu Glu Glu Tyr Leu Asn Pro Pro Val Glu Glu Glu  
 1190 1195 1200  
  
 Gly Asn Glu Glu Thr Thr Glu Val Val Val Asp Thr Ala Val Glu  
 1205 1210 1215  
  
 Thr Val Glu Glu Thr Val Glu

1220

1225

<210> 722  
 <211> 332  
 <212> PRT  
 <213> Streptococcus pneumoniae

&lt;400&gt; 722

Met Ser Met Lys Lys Ser Phe Ile His Gln Gln Glu Glu Ile Ser Phe  
 1 5 10 15

Val Lys Asn Thr Phe Thr Gln Tyr Leu Lys Asp Lys Leu Glu Val Val  
 20 25 30

Glu Val Gln Gly Pro Ile Leu Ser Lys Val Gly Asp Gly Met Gln Asp  
 35 40 45

Asn Leu Ser Gly Val Glu Asn Pro Val Ser Val Lys Val Leu Gln Ile  
 50 55 60

Pro Asp Ala Thr Tyr Glu Val Val His Ser Leu Ala Lys Trp Lys Arg  
 65 70 75 80

His Thr Leu Ala Arg Phe Gly Phe Gly Glu Gly Glu Gly Leu Phe Val  
 85 90 95

His Met Lys Ala Leu Arg Pro Asp Glu Asp Ser Leu Asp Ala Thr His  
 100 105 110

Ser Val Tyr Val Asp Gln Trp Asp Trp Glu Lys Val Ile Pro Asn Gly  
 115 120 125

Lys Arg Asn Ile Val Tyr Leu Lys Glu Thr Val Glu Lys Ile Tyr Lys  
 130 135 140

Ala Ile Arg Leu Thr Glu Leu Ala Val Glu Ala Arg Tyr Asp Ile Glu  
 145 150 155 160

Ser Ile Leu Pro Lys Gln Ile Thr Phe Ile His Thr Glu Glu Leu Val  
 165 170 175

Glu Arg Tyr Pro Asp Leu Thr Pro Lys Glu Arg Glu Asn Ala Ile Cys

180                      185                      190  
 Lys Glu Phe Gly Ala Val Phe Leu Ile Gly Ile Gly Gly Glu Leu Pro  
           195                      200                      205  
 Asp Gly Lys Pro His Asp Gly Arg Ala Pro Asp Tyr Asp Asp Trp Thr  
           210                      215                      220  
 Ser Glu Ser Glu Asn Gly Tyr Lys Gly Leu Asn Gly Asp Ile Leu Val  
           225                      230                      235                      240  
 Trp Asn Glu Ser Leu Gly Gly Ala Phe Glu Leu Ser Ser Met Gly Ile  
                                  245                      250                      255  
 Arg Val Asp Glu Glu Thr Leu Arg Arg Gln Val Glu Ile Thr Gly Asp  
                                  260                      265                      270  
 Glu Asp Arg Leu Glu Leu Glu Trp His Lys Ser Leu Leu Asn Gly Leu  
                                  275                      280                      285  
 Phe Pro Leu Thr Ile Gly Gly Gly Ile Gly Gln Ser Arg Met Ala Met  
                                  290                      295                      300  
 Phe Leu Leu Arg Lys Arg His Ile Gly Glu Val Gln Thr Ser Val Trp  
                                  305                      310                      315                      320  
 Pro Gln Glu Val Arg Asp Thr Tyr Glu Asn Ile Leu  
                                  325                      330  
  
 <210> 723  
 <211> 275  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 723  
 Met Lys Leu Arg Arg Ser Asp Arg Met Val Val Ile Ser Asn Tyr Leu  
   1                      5                      10                      15  
  
 Ile Asn Asn Pro Tyr Lys Leu Thr Ser Leu Asn Thr Phe Ala Glu Lys  
                                  20                      25                      30  
  
 Tyr Glu Ser Ala Lys Ser Ser Ile Ser Glu Asp Ile Val Ile Ile Lys

35					40					45					
Arg	Ala	Phe	Glu	Glu	Ile	Glu	Ile	Gly	His	Ile	Gln	Thr	Val	Thr	Gly
50						55					60				
Ala	Gly	Gly	Gly	Val	Ile	Phe	Thr	Pro	Ser	Ile	Ser	Ser	Gln	Asp	Ala
65					70					75					80
Lys	Glu	Met	Val	Glu	Asp	Leu	Arg	Thr	Lys	Leu	Ser	Glu	Ser	Asp	Arg
				85					90					95	
Ile	Leu	Pro	Gly	Gly	Tyr	Ile	Tyr	Leu	Ser	Asp	Leu	Leu	Ser	Thr	Pro
			100					105					110		
Ala	Ile	Leu	Lys	Asn	Ile	Gly	Arg	Ile	Ile	Ala	Lys	Ser	Phe	Met	Asp
		115					120					125			
Gln	Lys	Ile	Asp	Ala	Val	Met	Thr	Val	Ala	Thr	Lys	Gly	Val	Pro	Leu
	130					135					140				
Ala	Asn	Ala	Val	Ala	Asn	Val	Leu	Asn	Val	Ser	Phe	Val	Ile	Val	Arg
145					150					155					160
Arg	Asp	Leu	Lys	Ile	Thr	Glu	Gly	Ser	Thr	Val	Ser	Val	Asn	Tyr	Val
				165					170					175	
Ser	Gly	Ser	Ser	Gly	Asp	Arg	Ile	Glu	Lys	Met	Phe	Leu	Ser	Lys	Arg
			180					185					190		
Ser	Leu	Lys	Ala	Gly	Ser	Arg	Val	Leu	Ile	Val	Asp	Asp	Phe	Leu	Lys
	195						200					205			
Gly	Gly	Gly	Thr	Val	Asn	Gly	Met	Ile	Ser	Leu	Leu	Arg	Glu	Phe	Asp
	210					215						220			
Ser	Glu	Leu	Ala	Gly	Val	Ala	Val	Phe	Ala	Asp	Asn	Ala	Gln	Glu	Glu
225					230					235					240
Arg	Glu	Lys	Gln	Phe	Asp	Tyr	Lys	Ser	Leu	Leu	Lys	Val	Thr	Asn	Ile
				245					250					255	



Asp Val Lys Asn Gln Ala Ile Asp Val Glu Val Gly Asn Ile Phe Asp  
 260 265 270

Glu Asp Lys  
 275

<210> 724  
 <211> 404  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 724

Met Lys Glu Tyr Asn Lys Ser Ser Lys Leu Glu His Val Ala Tyr Asp  
 1 5 10 15

Ile Arg Gly Pro Val Leu Glu Glu Ala Met Arg Met Arg Ala Asn Gly  
 20 25 30

Glu Lys Ile Leu Arg Leu Asn Thr Gly Asn Pro Ala Glu Phe Gly Phe  
 35 40 45

Thr Ala Pro Asp Glu Val Ile His Asp Leu Ile Met Asn Ala Arg Asp  
 50 55 60

Ser Glu Gly Tyr Ser Asp Ser Lys Gly Ile Phe Ser Ala Arg Lys Ala  
 65 70 75 80

Ile Met Gln Tyr Cys Gln Leu Lys Lys Phe Pro Asn Val Asp Thr Asp  
 85 90 95

Asp Ile Tyr Leu Gly Asn Gly Val Ser Glu Leu Ile Val Met Ser Met  
 100 105 110

Gln Gly Leu Leu Asp Asn Gly Asp Glu Val Leu Val Pro Met Pro Asp  
 115 120 125

Tyr Pro Leu Trp Thr Ala Ala Val Ser Leu Ala Gly Gly Asn Ala Val  
 130 135 140

His Tyr Ile Cys Asp Glu Ala Val Glu Trp Tyr Pro Asp Ile Asp Asp  
 145 150 155 160

Ile Lys Ser Lys Ile Thr Ser Asn Thr Lys Ala Ile Val Leu Ile Asn  
 165 170 175

Pro Asn Asn Pro Thr Gly Ala Leu Tyr Pro Lys Glu Leu Leu Leu Glu  
 180 185 190

Ile Ile Glu Ile Ala Arg Gln Asn Asp Leu Ile Ile Phe Ala Asp Glu  
 195 200 205

Ile Tyr Asp Arg Met Val Met Asp Gly His Val His Thr Pro Val Ala  
 210 215 220

Ser Leu Ala Pro Asp Val Phe Cys Val Ser Met Asn Gly Leu Ser Lys  
 225 230 235 240

Ser His Arg Ile Ala Gly Phe Arg Val Gly Trp Met Val Leu Ser Gly  
 245 250 255

Pro Lys Thr His Val Lys Gly Tyr Ile Glu Gly Leu Asn Met Leu Ser  
 260 265 270

Asn Met Arg Leu Cys Ser Asn Val Leu Ala Gln Gln Val Val Gln Thr  
 275 280 285

Ser Leu Gly Gly His Gln Ser Val Asp Glu Leu Leu Leu Pro Gly Gly  
 290 295 300

Arg Ile Tyr Glu Gln Arg Asn Phe Ile Tyr Asn Ala Ile Gln Asp Ile  
 305 310 315 320

Pro Gly Leu Ser Ala Val Lys Pro Lys Ala Gly Leu Tyr Ile Phe Pro  
 325 330 335

Lys Ile Asp Arg Asn Met Tyr Arg Ile Asp Asp Asp Glu Gln Phe Val  
 340 345 350

Leu Asp Phe Leu Lys Gln Glu Lys Val Leu Leu Val His Gly Arg Gly  
 355 360 365

Phe Asn Trp Gln Glu Pro Asp His Phe Arg Ile Val Tyr Leu Pro Arg  
 370 375 380

Val Asp Glu Leu Ala Gln Ile Gln Glu Lys Met Thr Arg Phe Leu Lys  
 385 390 395 400

Gln Tyr Arg Arg

<210> 725  
 <211> 171  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 725

Met Leu Tyr Phe Tyr Ser Glu Lys Val Tyr Asn Tyr Ser Lys Lys Ile  
 1 5 10 15

Ser Gly Gly Phe Ile Met Ala Gln Arg Tyr Gln Asn Ile Met Val Ala  
 20 25 30

Ile Asp Gly Ser Lys Glu Ala Asp Leu Ala Phe Val Lys Gly Val His  
 35 40 45

Ser Ala Leu Arg Asn Asp Ala Lys Leu Thr Ile Ala His Val Ile Asp  
 50 55 60

Thr Arg Ala Leu Gln Ser Val Ser Thr Phe Asp Ala Glu Val Tyr Glu  
 65 70 75 80

Glu Leu Gln Val Asp Ala Glu Ser Leu Met Lys Glu Tyr Glu Lys Arg  
 85 90 95

Ala Lys Asp Ala Gly Val Ala Asp Val His Ile Val Ile Glu Met Gly  
 100 105 110

Asn Pro Lys Thr Leu Leu Ala Arg Thr Ile Pro Asp Ala Glu Glu Val  
 115 120 125

Asp Leu Ile Leu Val Gly Ala Thr Gly Leu Asn Ala Phe Glu Arg Leu  
 130 135 140

Leu Val Gly Ser Ser Ser Glu Tyr Ile Leu Arg His Ala Lys Val Asp  
 145 150 155 160

Leu Leu Val Val Arg Glu Gln Glu Lys Thr Leu  
 165 170

<210> 726  
 <211> 346  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 726

Met Cys Glu Ile Glu Arg Thr Gly Lys Gly Met Asn Ala Asp Asp Thr  
 1 5 10 15

Val Thr Ile Tyr Asp Val Ala Arg Glu Ala Gly Val Ser Met Ala Thr  
 20 25 30

Val Ser Arg Val Val Asn Gly Asn Lys Asn Val Lys Glu Asn Thr Arg  
 35 40 45

Lys Lys Val Leu Glu Val Ile Asp Arg Leu Asp Tyr Arg Pro Asn Ala  
 50 55 60

Val Ala Arg Gly Leu Ala Ser Lys Lys Thr Thr Thr Val Gly Val Val  
 65 70 75 80

Ile Pro Asn Ile Thr Asn Gly Tyr Phe Ser Ser Leu Ala Lys Gly Ile  
 85 90 95

Asp Asp Ile Ala Glu Met Tyr Lys Tyr Asn Ile Val Leu Ala Asn Ser  
 100 105 110

Asp Glu Asp Asn Glu Lys Glu Val Ser Val Val Asn Thr Leu Phe Ser  
 115 120 125

Lys Gln Val Asp Gly Ile Ile Tyr Met Gly Tyr His Leu Thr Asp Lys  
 130 135 140

Ile Arg Ser Glu Phe Ser Arg Ser Arg Thr Pro Ile Val Leu Ala Gly  
 145 150 155 160

Thr Val Asp Val Glu His Gln Leu Pro Ser Val Asn Ile Asp Tyr Lys  
 165 170 175

Gln Ala Thr Ile Asp Ala Val Ser Tyr Leu Ala Lys Glu Asn Glu Arg  
 180 185 190

Ile Ala Phe Val Ser Gly Pro Leu Val Asp Asp Ile Asn Gly Lys Val  
 195 200 205

Arg Leu Val Gly Tyr Lys Glu Thr Leu Lys Lys Ala Gly Ile Thr Tyr  
 210 215 220

Ser Glu Gly Leu Val Phe Glu Ser Lys Tyr Ser Tyr Asp Asp Gly Tyr  
 225 230 235 240

Ala Leu Ala Glu Arg Leu Ile Ser Ser Asn Ala Thr Ala Ala Val Val  
 245 250 255

Thr Gly Asp Glu Leu Ala Ala Gly Val Leu Asn Gly Leu Ala Asp Lys  
 260 265 270

Gly Val Ser Val Pro Glu Asp Phe Glu Ile Ile Thr Ser Asp Asp Ser  
 275 280 285

Gln Ile Ser Arg Phe Thr Arg Pro Asn Leu Thr Thr Ile Ala Gln Pro  
 290 295 300

Leu Tyr Asp Leu Gly Ala Ile Ser Met Arg Met Leu Thr Lys Ile Met  
 305 310 315 320

His Lys Glu Glu Leu Glu Glu Arg Glu Val Leu Leu Pro His Gly Leu  
 325 330 335

Thr Glu Arg Ser Ser Thr Arg Lys Arg Lys  
 340 345

<210> 727

<211> 183

<212> PRT

<213> Streptococcus pneumoniae

<400> 727

Met Lys Gly Asn Ile Met Asp Ser Phe Asp Lys Gly Trp Phe Val Leu  
 1 5 10 15

Gln Thr Tyr Ser Gly Tyr Glu Asn Lys Val Lys Glu Asn Leu Leu Gln  
 20 25 30

Arg Ala Gln Thr Tyr Asn Met Leu Asp Asn Ile Leu Arg Val Glu Ile  
 35 40 45

Pro Thr Gln Thr Val Gln Val Glu Lys Asn Gly Lys Arg Lys Glu Val  
 50 55 60

Glu Glu Asn Arg Phe Pro Gly Tyr Val Leu Val Glu Met Val Met Thr  
 65 70 75 80

Asp Glu Ala Trp Phe Val Val Arg Asn Thr Pro Asn Val Thr Gly Phe  
 85 90 95

Val Gly Ser His Gly Asn Arg Ser Lys Pro Thr Pro Leu Leu Glu Gln  
 100 105 110

Glu Ile Arg Asp Ile Leu Val Ser Met Gly Gln Thr Val Gln Glu Phe  
 115 120 125

Asp Phe Asp Val Glu Ile Gly Gln Thr Val Arg Ile Ile Asp Gly Ala  
 130 135 140

Phe Ala Asp Tyr Thr Gly Lys Ile Thr Glu Ile Asp Asn Asn Lys Val  
 145 150 155 160

Lys Met Ile Ile Ser Met Phe Gly Asn Asp Thr Val Ala Glu Val Asn  
 165 170 175

Leu Asn Gln Ile Ala Glu Leu  
 180

<210> 728

<211> 731

<212> PRT

<213> Streptococcus pneumoniae

<400> 728

Met Lys Leu Asp Lys Leu Phe Glu Lys Phe Leu Ser Leu Phe Lys Lys  
 1 5 10 15

Glu Thr Ser Glu Leu Glu Asp Ser Asp Ser Thr Ile Leu Arg Arg Ser  
 20 25 30

Arg Ser Asp Arg Lys Lys Leu Ala Gln Val Gly Pro Ile Arg Lys Phe  
 35 40 45

Trp Arg Arg Tyr His Leu Thr Lys Ile Ile Leu Ile Leu Gly Leu Ser  
 50 55 60

Ala Gly Leu Leu Val Gly Ile Tyr Leu Phe Ala Val Ala Lys Ser Thr  
 65 70 75 80

Asn Val Asn Asp Leu Gln Asn Ala Leu Lys Thr Arg Thr Leu Ile Phe  
 85 90 95

Asp Arg Glu Glu Lys Glu Ala Gly Ala Leu Ser Gly Gln Lys Gly Thr  
 100 105 110

Tyr Val Glu Leu Thr Asp Ile Ser Lys Asn Leu Gln Asn Ala Val Ile  
 115 120 125

Ala Thr Glu Asp Arg Ser Phe Tyr Lys Asn Asp Gly Ile Asn Tyr Gly  
 130 135 140

Arg Phe Phe Leu Ala Ile Val Thr Ala Gly Arg Ser Gly Gly Gly Ser  
 145 150 155 160

Thr Ile Thr Gln Gln Leu Ala Lys Asn Ala Tyr Leu Ser Gln Asp Gln  
 165 170 175

Thr Val Glu Arg Lys Ala Lys Glu Phe Phe Leu Ala Leu Glu Leu Ser  
 180 185 190

Lys Lys Tyr Ser Lys Glu Gln Ile Leu Thr Met Tyr Leu Asn Asn Ala  
 195 200 205

Tyr Phe Gly Asn Gly Val Trp Gly Val Glu Asp Ala Ser Lys Lys Tyr  
 210 215 220

Phe Gly Val Ser Ala Ser Glu Val Ser Leu Asp Gln Ala Ala Thr Leu  
 225 230 235 240

Ala Gly Met Leu Lys Gly Pro Glu Leu Tyr Asn Pro Leu Asn Ser Val  
 245 250 255

Glu Asp Ser Thr Asn Arg Arg Asp Thr Val Leu Gln Asn Met Val Ala  
 260 265 270

Ala Gly Tyr Ile Asp Lys Asn Gln Glu Thr Lys Ala Ala Glu Val Asp  
 275 280 285

Met Thr Ser Gln Leu His Asp Lys Tyr Glu Gly Lys Ile Ser Asp Tyr  
 290 295 300

Arg Tyr Pro Ser Tyr Phe Asp Ala Val Val Asn Glu Ala Val Ser Lys  
 305 310 315 320

Tyr Asn Leu Thr Glu Glu Glu Ile Val Asn Asn Gly Tyr Arg Ile Tyr  
 325 330 335

Thr Glu Leu Asp Gln Asn Tyr Gln Ala Asn Met Gln Ile Val Tyr Glu  
 340 345 350

Asn Thr Ser Leu Phe Pro Arg Ala Glu Asp Gly Thr Phe Ala Gln Ser  
 355 360 365

Gly Ser Val Ala Leu Glu Pro Lys Thr Gly Gly Val Arg Gly Val Val  
 370 375 380

Gly Gln Val Ala Asp Asn Asp Lys Thr Gly Phe Arg Asn Phe Asn Tyr  
 385 390 395 400

Ala Thr Gln Ser Lys Arg Ser Pro Gly Ser Thr Ile Lys Pro Leu Val  
 405 410 415

Val Tyr Thr Pro Ala Val Glu Ala Ser Trp Ala Leu Asn Lys Gln Leu  
 420 425 430

Asp Asn His Thr Met Gln Tyr Asp Ser Tyr Lys Val Asp Asn Tyr Ala  
 435 440 445

Gly Ile Lys Thr Ser Arg Glu Val Pro Met Tyr Gln Ala Leu Ala Glu



450		455		460
Ser Leu Asn Leu Pro Ala Val Ala Thr Val Asn Asp Leu Gly Val Asp				
465		470		475 480
Lys Ala Phe Glu Ala Gly Glu Lys Phe Gly Leu Asn Met Glu Lys Val				
	485		490	495
Asp Arg Val Leu Gly Val Ala Leu Gly Ser Gly Val Glu Thr Asn Pro				
	500		505	510
Leu Gln Met Ala Gln Ala Tyr Ala Ala Phe Ala Asn Glu Gly Leu Met				
	515		520	525
Pro Glu Ala His Phe Ile Ser Arg Ile Glu Asn Ala Ser Gly Gln Val				
	530		535	540
Ile Ala Ser His Lys Asn Ser Gln Lys Arg Val Ile Asp Lys Ser Val				
	545		550	555 560
Ala Asp Lys Met Thr Ser Met Met Leu Gly Thr Phe Thr Asn Gly Thr				
	565		570	575
Gly Ile Ser Ser Ser Pro Ala Asp Tyr Val Met Ala Gly Lys Thr Gly				
	580		585	590
Thr Thr Glu Ala Val Phe Asn Pro Glu Tyr Thr Ser Asp Gln Trp Val				
	595		600	605
Ile Gly Tyr Thr Pro Asp Val Val Ile Ser His Trp Leu Gly Phe Pro				
	610		615	620
Thr Thr Asp Glu Asn His Tyr Leu Ala Gly Ser Thr Ser Asn Gly Ala				
	625		630	635 640
Ala His Val Phe Arg Asn Ile Ala Asn Thr Ile Leu Pro Tyr Thr Pro				
	645		650	655
Gly Ser Thr Phe Thr Val Glu Asn Ala Tyr Lys Gln Asn Gly Ile Ala				
	660		665	670

Pro Ala Asn Thr Lys Arg Gln Val Gln Thr Asn Asp Asn Ser Gln Thr  
 675 680 685

Asp Asp Asn Leu Ser Asp Ile Arg Gly Arg Ala Gln Ser Leu Val Asp  
 690 695 700

Glu Ala Ser Arg Ala Ile Ser Asp Ala Lys Ile Lys Glu Lys Ala Gln  
 705 710 715 720

Thr Ile Trp Asp Ser Ile Val Asn Leu Phe Arg  
 725 730

<210> 729

<211> 396

<212> PRT

<213> Streptococcus pneumoniae

<400> 729

Met Thr Lys Thr Ile Ala Ile Asn Ala Gly Ser Ser Ser Leu Lys Trp  
 1 5 10 15

Gln Leu Tyr Leu Met Pro Glu Glu Lys Val Leu Ala Lys Gly Leu Ile  
 20 25 30

Glu Arg Ile Gly Leu Lys Asp Ser Ile Ser Thr Val Lys Phe Asp Gly  
 35 40 45

Arg Ser Glu Gln Gln Ile Leu Asp Ile Glu Asn His Ile Gln Ala Val  
 50 55 60

Lys Ile Leu Leu Asp Asp Leu Ile Arg Phe Asp Ile Ile Lys Ala Tyr  
 65 70 75 80

Asp Glu Ile Thr Gly Val Gly His Arg Val Val Ala Gly Gly Glu Tyr  
 85 90 95

Phe Lys Glu Ser Thr Val Val Glu Gly Asp Val Leu Glu Lys Val Glu  
 100 105 110

Glu Leu Ser Leu Leu Ala Pro Leu His Asn Pro Ala Asn Ala Ala Gly  
 115 120 125

Val Arg Ala Phe Lys Glu Leu Leu Pro Asp Ile Thr Ser Val Val Val  
 130 135 140

Phe Asp Thr Ser Phe His Thr Ser Met Pro Glu Lys Ala Tyr Arg Tyr  
 145 150 155 160

Pro Leu Pro Thr Lys Tyr Tyr Thr Glu Asn Lys Val Arg Lys Tyr Gly  
 165 170 175

Ala His Gly Thr Ser His Gln Phe Val Ala Gly Glu Ala Ala Lys Leu  
 180 185 190

Leu Gly Arg Pro Leu Glu Asp Leu Lys Leu Ile Thr Cys His Ile Gly  
 195 200 205

Asn Gly Gly Ser Ile Thr Ala Val Lys Ala Gly Lys Ser Val Asp Thr  
 210 215 220

Ser Met Gly Phe Thr Pro Leu Gly Gly Ile Met Met Gly Thr Arg Thr  
 225 230 235 240

Gly Asp Ile Asp Pro Ala Ile Ile Pro Tyr Leu Met Gln Tyr Thr Glu  
 245 250 255

Asp Phe Asn Thr Pro Glu Asp Ile Ser Arg Val Leu Asn Arg Glu Ser  
 260 265 270

Gly Leu Leu Gly Val Ser Ala Asn Ser Ser Asp Met Arg Asp Ile Glu  
 275 280 285

Ala Ala Val Ala Glu Gly Asn His Glu Ala Ser Leu Ala Tyr Glu Met  
 290 295 300

Tyr Val Asp Arg Ile Gln Lys His Ile Gly Gln Tyr Leu Ala Val Leu  
 305 310 315 320

Asn Gly Ala Asp Ala Ile Val Phe Thr Ala Gly Val Gly Glu Asn Ala  
 325 330 335

Glu Ser Phe Arg Arg Asp Val Ile Ser Gly Ile Ser Trp Phe Gly Cys  
 340 345 350

Asp Val Asp Asp Glu Lys Asn Val Phe Gly Val Thr Gly Asp Ile Ser  
 355 360 365

Thr Glu Ala Ala Lys Ile Arg Val Leu Val Ile Pro Thr Asp Glu Glu  
 370 375 380

Leu Val Ile Ala Arg Asp Val Glu Arg Leu Lys Lys  
 385 390 395

<210> 730

<211> 352

<212> PRT

<213> Streptococcus pneumoniae

<400> 730

Met Lys Ala Tyr Thr Tyr Val Lys Pro Gly Leu Ala Ser Phe Val Asp  
 1 5 10 15

Val Asp Lys Pro Val Ile Arg Lys Pro Thr Asp Ala Ile Val Arg Ile  
 20 25 30

Val Lys Thr Thr Ile Cys Gly Thr Asp Leu His Ile Ile Lys Gly Asp  
 35 40 45

Val Pro Thr Cys Gln Ser Gly Thr Ile Leu Gly His Glu Gly Ile Gly  
 50 55 60

Ile Val Glu Glu Val Gly Glu Gly Val Ser Asn Phe Lys Lys Gly Asp  
 65 70 75 80

Lys Val Leu Ile Ser Cys Val Cys Ala Cys Gly Lys Cys Tyr Tyr Cys  
 85 90 95

Lys Lys Gly Ile Tyr Ala His Cys Glu Asp Glu Gly Gly Trp Ile Phe  
 100 105 110

Gly His Leu Ile Asp Gly Met Gln Ala Glu Tyr Leu Arg Val Pro His  
 115 120 125

Ala Asp Asn Thr Leu Tyr His Thr Pro Glu Asp Leu Ser Asp Glu Ala  
 130 135 140

Leu Val Met Leu Ser Asp Ile Leu Pro Thr Gly Tyr Glu Ile Gly Val  
 145 150 155 160

Leu Lys Gly Lys Val Glu Pro Gly Cys Ser Val Ala Ile Ile Gly Ser  
 165 170 175

Gly Pro Val Gly Leu Ala Ala Leu Leu Thr Ala Gln Phe Tyr Ser Pro  
 180 185 190

Ala Lys Leu Ile Met Val Asp Leu Asp Asp Asn Arg Leu Glu Thr Ala  
 195 200 205

Leu Ser Phe Gly Ala Thr His Lys Val Asn Ser Ser Asp Pro Glu Lys  
 210 215 220

Ala Ile Lys Glu Ile Tyr Asp Leu Thr Asp Gly Arg Gly Val Asp Val  
 225 230 235 240

Ala Ile Glu Ala Val Gly Ile Pro Ala Thr Phe Asp Phe Cys Gln Lys  
 245 250 255

Ile Ile Gly Val Asp Gly Thr Val Ala Asn Cys Gly Val His Gly Lys  
 260 265 270

Pro Val Glu Phe Asp Leu Asp Lys Leu Trp Ile Arg Asn Ile Asn Val  
 275 280 285

Thr Thr Gly Leu Val Ser Thr Asn Thr Thr Pro Gln Leu Leu Lys Ala  
 290 295 300

Leu Glu Ser His Lys Ile Glu Pro Glu Lys Leu Val Thr His Tyr Phe  
 305 310 315 320

Lys Leu Ser Glu Ile Glu Lys Ala Tyr Glu Val Phe Ser Lys Ala Ala  
 325 330 335

Asp His His Ala Ile Lys Val Ile Ile Glu Asn Asp Ile Ser Glu Ala  
 340 345 350

<210> 731

<211> 564

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae

&lt;400&gt; 731

Met Leu Ile Gln Lys Ile Lys Thr Tyr Lys Trp Gln Ala Leu Ala Ser  
 1 5 10 15

Leu Leu Met Thr Gly Leu Met Val Ala Ser Ser Leu Leu Gln Pro Arg  
 20 25 30

Tyr Leu Gln Glu Val Leu Gly Ala Leu Leu Thr Gly Lys Tyr Glu Ala  
 35 40 45

Ile Tyr Ser Ile Gly Ala Trp Leu Ile Gly Val Ala Val Val Gly Leu  
 50 55 60

Val Ala Gly Gly Leu Asn Val Val Leu Ala Ala Tyr Ile Ala Gln Gly  
 65 70 75 80

Val Ser Ser Asp Leu Arg Glu Asp Ala Phe Arg Lys Ile Gln Thr Phe  
 85 90 95

Ser Tyr Ala Asp Ile Glu Gln Phe Asn Ala Gly Asn Leu Val Val Arg  
 100 105 110

Met Thr Asn Asp Ile Asn Gln Ile Gln Asn Val Val Met Met Thr Phe  
 115 120 125

Gln Ile Leu Phe Arg Leu Pro Leu Leu Phe Ile Gly Ser Phe Ile Leu  
 130 135 140

Ala Val Gln Thr Leu Pro Ser Leu Trp Trp Val Ile Val Leu Met Val  
 145 150 155 160

Val Leu Ile Phe Gly Leu Thr Ala Val Met Met Gly Met Met Gly Pro  
 165 170 175

Arg Phe Ala Lys Phe Gln Thr Leu Leu Glu Arg Ile Asn Ala Ile Ala  
 180 185 190

Lys Glu Asn Leu Arg Gly Val Arg Val Val Lys Ser Phe Val Gln Glu  
 195 200 205

Lys Glu Gln Phe Ala Lys Phe Thr Glu Val Ser Asp Glu Leu Leu Gly  
 210 215 220  
 Gln Asn Leu Tyr Ile Gly Tyr Ala Phe Ser Val Val Glu Pro Phe Met  
 225 230 235 240  
 Met Leu Val Gly Tyr Gly Ala Val Phe Leu Ser Ile Trp Leu Val Ala  
 245 250 255  
 Gly Met Val Gln Ser Asp Pro Ser Val Val Gly Ser Ile Ala Ser Phe  
 260 265 270  
 Val Asn Tyr Leu Ser Gln Ile Ile Phe Thr Ile Val Met Val Gly Phe  
 275 280 285  
 Leu Gly Asn Ser Val Ser Arg Ala Met Ile Ser Met Arg Arg Ile Arg  
 290 295 300  
 Glu Ile Leu Asp Ala Glu Pro Ala Met Thr Phe Lys Asp Ile Pro Asp  
 305 310 315 320  
 Glu Glu Leu Val Gly Ser Leu Ser Phe Glu Asn Val Thr Phe Thr Tyr  
 325 330 335  
 Pro Met Asp Lys Glu Pro Met Leu Lys Asp Val Ser Phe Thr Ile Glu  
 340 345 350  
 Pro Gly Gln Met Val Gly Val Val Gly Ala Thr Gly Ala Gly Lys Ser  
 355 360 365  
 Thr Leu Ala Gln Leu Ile Pro Arg Leu Phe Asp Pro Gln Asp Gly Ala  
 370 375 380  
 Ile Lys Ile Gly Gly Lys Asp Ile Arg Glu Val Ser Glu Gly Thr Leu  
 385 390 395 400  
 Arg Lys Thr Val Ser Ile Val Leu Gln Arg Ala Ile Leu Phe Ser Gly  
 405 410 415  
 Thr Ile Ala Asp Asn Leu Arg Gln Gly Lys Gly Asn Ala Thr Leu Phe

[illegible]

```
<210> 732
<211> 338
<212> PRT
<213> Streptococcus pneumoniae
```

<400> 732

Met Glu Lys Gln Thr Val Ala Val Leu Gly Pro Gly Ser Trp Gly Thr  
1 5 10 15

Ala Leu Ser Gln Val Leu Asn Asp Asn Gly His Glu Val Arg Ile Trp  
20 25 30

Gly Asn Leu Pro Glu Gln Ile Asn Glu Ile Asn Thr His His Thr Asn



35	40	45																	
Lys	His	Tyr	Phe	Lys	Asp	Val	Val	Leu	Asp	Glu	Asn	Ile	Ile	Ala	Tyr				
50						55					60								
Thr	Asp	Leu	Ala	Glu	Thr	Leu	Lys	Asp	Val	Asp	Ala	Ile	Leu	Phe	Val				
65					70					75					80				
Val	Pro	Thr	Lys	Val	Thr	Arg	Leu	Val	Ala	Gln	Gln	Val	Ala	Gln	Thr				
				85					90					95					
Leu	Asp	His	Lys	Val	Ile	Ile	Met	His	Ala	Ser	Lys	Gly	Leu	Glu	Pro				
			100					105					110						
Asp	Ser	His	Lys	Arg	Leu	Ser	Thr	Ile	Leu	Glu	Glu	Glu	Ile	Pro	Glu				
		115					120					125							
His	Leu	Arg	Ser	Asp	Ile	Val	Val	Val	Ser	Gly	Pro	Ser	His	Ala	Glu				
	130					135					140								
Glu	Thr	Ile	Val	Arg	Asp	Leu	Thr	Leu	Ile	Thr	Ala	Ala	Ser	Lys	Asp				
145					150					155					160				
Leu	Gln	Thr	Ala	Gln	Tyr	Val	Gln	Lys	Leu	Phe	Ser	Asn	His	Tyr	Phe				
				165					170					175					
Arg	Leu	Tyr	Thr	Asn	Thr	Asp	Val	Ile	Gly	Val	Glu	Thr	Ala	Gly	Ala				
			180					185					190						
Leu	Lys	Asn	Ile	Ile	Ala	Val	Gly	Ala	Gly	Ala	Leu	His	Gly	Leu	Gly				
		195					200					205							
Phe	Gly	Asp	Asn	Ala	Lys	Ala	Ala	Ile	Ile	Ala	Arg	Gly	Leu	Ala	Glu				
	210					215					220								
Ile	Thr	Arg	Leu	Gly	Val	Ala	Leu	Gly	Ala	Ser	Pro	Leu	Thr	Tyr	Ser				
225					230					235				240					
Gly	Leu	Ser	Gly	Val	Gly	Asp	Leu	Ile	Val	Thr	Gly	Thr	Ser	Ile	His				
			245						250					255					

Ser Arg Asn Trp Arg Ala Gly Asp Ala Leu Gly Arg Gly Glu Ser Leu  
                   260                                  265                                  270

Ala Asp Ile Glu Ala Asn Met Gly Met Val Ile Glu Gly Ile Ser Thr  
                   275                                  280                                  285

Thr Arg Ala Ala Tyr Glu Leu Ala Gln Glu Leu Gly Val Tyr Met Pro  
                   290                                  295                                  300

Ile Thr Gln Ala Ile Tyr Gln Val Ile Tyr His Gly Thr Asn Ile Lys  
                   305                                  310                                  315                                  320

Asp Ala Ile Tyr Asp Ile Met Asn Asn Glu Phe Lys Ala Glu Asn Glu  
                   325                                  330                                  335

Trp Ser

<210> 733  
 <211> 423  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 733

Met Ser Ser Lys Phe Met Lys Ser Ala Ala Val Leu Gly Thr Ala Thr  
                   1                                  5                                  10                                  15

Leu Ala Ser Leu Leu Leu Val Ala Cys Gly Ser Lys Thr Ala Asp Lys  
                   20                                  25                                  30

Pro Ala Asp Ser Gly Ser Ser Glu Val Lys Glu Leu Thr Val Tyr Val  
                   35                                  40                                  45

Asp Glu Gly Tyr Lys Ser Tyr Ile Glu Glu Val Ala Lys Ala Tyr Glu  
                   50                                  55                                  60

Lys Glu Ala Gly Val Lys Val Thr Leu Lys Thr Gly Asp Ala Leu Gly  
                   65                                  70                                  75                                  80

Gly Leu Asp Lys Leu Ser Leu Asp Asn Gln Ser Gly Asn Val Pro Asp  
                   85                                  90                                  95

Val Met Met Ala Pro Tyr Asp Arg Val Gly Ser Leu Gly Ser Asp Gly  
 100 105 110

Gln Leu Ser Glu Val Lys Leu Ser Asp Gly Ala Lys Thr Asp Asp Thr  
 115 120 125

Thr Lys Ser Leu Val Thr Ala Ala Asn Gly Lys Val Tyr Gly Ala Pro  
 130 135 140

Ala Val Ile Glu Ser Leu Val Met Tyr Tyr Asn Lys Asp Leu Val Lys  
 145 150 155 160

Asp Ala Pro Lys Thr Phe Ala Asp Leu Glu Asn Leu Ala Lys Asp Ser  
 165 170 175

Lys Tyr Ala Phe Ala Gly Glu Asp Gly Lys Thr Thr Ala Phe Leu Ala  
 180 185 190

Asp Trp Thr Asn Phe Tyr Tyr Thr Tyr Gly Leu Leu Ala Gly Asn Gly  
 195 200 205

Ala Tyr Val Phe Gly Gln Asn Gly Lys Asp Ala Lys Asp Ile Gly Leu  
 210 215 220

Ala Asn Asp Gly Ser Ile Val Gly Ile Asn Tyr Ala Lys Ser Trp Tyr  
 225 230 235 240

Glu Lys Trp Pro Lys Gly Met Gln Asp Thr Glu Gly Ala Gly Asn Leu  
 245 250 255

Ile Gln Thr Gln Phe Gln Glu Gly Lys Thr Ala Ala Ile Ile Asp Gly  
 260 265 270

Pro Trp Lys Ala Gln Ala Phe Lys Asp Ala Lys Val Asn Tyr Gly Val  
 275 280 285

Ala Thr Ile Pro Thr Leu Pro Asn Gly Lys Glu Tyr Ala Ala Phe Gly  
 290 295 300

Gly Gly Lys Ala Trp Val Ile Pro Gln Ala Val Lys Asn Leu Glu Ala  
 305 310 315 320

Ser Gln Lys Phe Val Asp Phe Leu Val Ala Thr Glu Gln Gln Lys Val  
325 330 335

Leu Tyr Asp Lys Thr Asn Glu Ile Pro Ala Asn Thr Glu Ala Arg Ser  
340 345 350

Tyr Ala Glu Gly Lys Asn Asp Glu Leu Thr Thr Ala Val Ile Lys Gln  
355 360 365

Phe Lys Asn Thr Gln Pro Leu Pro Asn Ile Ser Gln Met Ser Ala Val  
370 375 380

Trp Asp Pro Ala Lys Asn Met Leu Phe Asp Ala Val Ser Gly Gln Lys  
385 390 395 400

Asp Ala Lys Thr Ala Ala Asn Asp Ala Val Thr Leu Ile Lys Glu Thr  
405 410 415

Ile Lys Gln Lys Phe Gly Glu  
420

```
<210> 734
<211> 335
<212> PRT
<213> Streptococcus pneumoniae
```

<400> 734

Met Thr Glu Lys Leu Ile Asn Ser Lys Pro Asn Gly Val Phe Ala Leu  
1 5 10 15

Ile Leu Ile Glu Leu Thr Ile Val Leu Gly Ile Phe Ile Phe Ile Met  
20 25 30

Gly Val Gly Ser Glu Asn Ile Phe Gly Ile Ile Ile Gly Pro Leu Leu  
35 40 45

Ile Val Ile Ala Gly Leu Ala His Ala Gly Leu Lys Val Val Lys Pro  
50 55 60

Gln Glu Ala Leu Val Leu Thr Leu Phe Gly Asn Tyr Thr Gly Thr Ile  
65 70 75 80

Lys Glu Pro Gly Phe Tyr Phe Val Asn Pro Phe Ser Val Ala Val Asn  
85 90 95

Pro Ala Asn His Thr Arg Leu Gly Gln Ser Gly Asp Val Ser Thr Lys  
100 105 110

Ser Pro Phe Leu Gly Ala Lys Ser Ser Asn Asp Asn Asp Val Asn Leu  
115 120 125

Glu Ile Gly Lys Lys Gln Ile Ser Leu Lys Val Met Thr Leu Ser Asn  
130 135 140

Ser Arg Gln Lys Ile Asn Asp Cys Leu Gly Asn Pro Val Glu Ile Gly  
145 150 155 160

Ile Ala Val Thr Trp Arg Val Val Asp Thr Ala Lys Ala Val Phe Asn  
165 170 175

Val Asp Asn Tyr Lys Glu Tyr Leu Ser Leu Gln Cys Asp Ser Ala Leu  
180 185 190

Arg Asn Ile Val Arg Ile Tyr Pro Tyr Asp Val Ser Pro Asn Val Asp  
195 200 205

Thr Thr Gly Asp Gly Gln Ala Asp Glu Gly Ser Leu Arg Gly Ser Ser  
210 215 220

Glu Ile Val Ala Asn Arg Ile Arg Glu Glu Ile Gln Ser Arg Val Glu  
225 230 235 240

Asp Ala Gly Leu Glu Ile Leu Glu Ala Arg Ile Thr Tyr Leu Ala Tyr  
245 250 255

Ala Pro Glu Ile Ala Ala Val Met Leu Gln Arg Gln Gln Ala Ser Ala  
260 265 270

Ile Ile Asp Ala Arg Lys Met Ile Val Asp Gly Ala Val Gly Met Val  
275 280 285

Glu Met Ala Leu Glu Arg Leu Asn Glu Gly Glu Leu Val Glu Leu Asp  
290 295 300

Glu Glu Arg Lys Ala Ala Met Val Ser Asn Leu Leu Val Val Leu Cys  
 305 310 315 320

Gly Asn His Asp Ala Gln Pro Ile Val Asn Thr Gly Ser Leu Tyr  
 325 330 335

<210> 735  
 <211> 338  
 <212> PRT  
 <213> Streptococcus pneumoniae  
 <400> 735

Met Thr Asn Ser Val Phe Gln Gly Arg Ser Phe Leu Ala Glu Lys Asp  
 1 5 10 15

Phe Thr Arg Ala Glu Leu Glu Tyr Leu Ile Gly Leu Ser Ala His Leu  
 20 25 30

Lys Asp Leu Lys Lys Arg Asn Ile Gln His His Tyr Leu Ala Gly Lys  
 35 40 45

Asn Ile Ala Leu Leu Phe Glu Lys Thr Ser Thr Arg Thr Arg Ala Ala  
 50 55 60

Phe Thr Thr Ala Ala Ile Asp Leu Gly Ala His Pro Glu Tyr Leu Gly  
 65 70 75 80

Ala Asn Asp Ile Gln Leu Gly Lys Lys Glu Ser Thr Glu Asp Thr Ala  
 85 90 95

Lys Val Leu Gly Arg Met Phe Asp Gly Ile Glu Phe Arg Gly Phe Ser  
 100 105 110

Gln Arg Met Val Glu Glu Leu Ala Glu Phe Ser Gly Val Pro Val Trp  
 115 120 125

Asn Gly Leu Thr Asp Glu Trp His Pro Thr Gln Met Leu Ala Asp Tyr  
 130 135 140

Leu Thr Val Gln Glu Asn Phe Gly Arg Leu Glu Gly Leu Thr Leu Val  
 145 150 155 160

Tyr Cys Gly Asp Gly Arg Asn Asn Val Ala Asn Ser Leu Leu Val Thr  
 165 170 175  
 Gly Ala Ile Leu Gly Val Asn Val His Ile Phe Ser Pro Lys Glu Leu  
 180 185 190  
 Phe Pro Glu Lys Glu Ile Val Glu Leu Ala Glu Gly Phe Ala Lys Glu  
 195 200 205  
 Ser Gly Ala His Val Leu Ile Thr Glu Asp Ala Asp Glu Ala Val Lys  
 210 215 220  
 Asp Ala Asp Val Leu Tyr Thr Asp Val Trp Val Ser Met Gly Glu Glu  
 225 230 235 240  
 Asp Lys Phe Ala Glu Arg Val Ala Leu Leu Lys Pro Tyr Gln Val Asn  
 245 250 255  
 Met Asp Leu Val Lys Lys Ala Gly Asn Glu Asn Leu Ile Phe Leu His  
 260 265 270  
 Cys Leu Pro Ala Phe His Asp Thr His Thr Val Tyr Gly Lys Asp Val  
 275 280 285  
 Ala Glu Lys Phe Gly Val Glu Glu Met Glu Val Thr Asp Glu Val Phe  
 290 295 300  
 Arg Ser Lys Tyr Ala Arg His Phe Asp Gln Ala Glu Asn Arg Met His  
 305 310 315 320  
 Thr Ile Lys Ala Val Met Ala Ala Thr Leu Gly Asn Leu Tyr Ile Pro  
 325 330 335  
 Lys Val

<210> 736  
 <211> 299  
 <212> PRT  
 <213> Streptococcus pneumoniae

&lt;400&gt; 736

Met Ala Ile Phe Phe Met Ile Phe Leu Ile Val Cys Val Leu Leu Leu  
 1 5 10 15

Val Ile Val Thr Leu Ser Thr Val Tyr Val Val Arg Gln Gln Ser Val  
 20 25 30

Ala Ile Ile Glu Arg Phe Gly Lys Tyr Gln Lys Val Ala Asn Ser Gly  
 35 40 45

Ile His Ile Arg Leu Pro Phe Gly Ile Asp Ser Ile Ala Ala Arg Ile  
 50 55 60

Gln Leu Arg Leu Leu Gln Ser Asp Ile Val Val Glu Thr Lys Thr Lys  
 65 70 75 80

Asp Asn Val Phe Val Met Met Asn Val Ala Thr Gln Tyr Arg Val Asn  
 85 90 95

Glu Gln Ser Val Thr Asp Ala Tyr Tyr Lys Leu Ile Arg Pro Glu Ser  
 100 105 110

Gln Ile Lys Ser Tyr Ile Glu Asp Ala Leu Arg Ser Ser Val Pro Lys  
 115 120 125

Leu Thr Leu Asp Glu Leu Phe Glu Lys Lys Asp Glu Ile Ala Leu Glu  
 130 135 140

Val Gln His Gln Val Ala Glu Glu Met Thr Thr Tyr Gly Tyr Ile Ile  
 145 150 155 160

Val Lys Thr Leu Ile Thr Lys Val Glu Pro Asp Ala Glu Val Lys Gln  
 165 170 175

Ser Met Asn Glu Ile Asn Ala Ala Gln Arg Lys Arg Val Ala Ala Gln  
 180 185 190

Glu Leu Ala Glu Ala Asp Lys Ile Lys Ile Val Thr Ala Ala Glu Ala  
 195 200 205

Glu Ala Glu Lys Asp Arg Leu His Gly Val Gly Ile Ala Gln Gln Arg



210                      215                      220  
 Lys Ala Ile Val Asp Gly Leu Ala Glu Ser Ile Thr Glu Leu Lys Glu  
 225                      230                      235                      240  
 Ala Asn Val Gly Met Thr Glu Glu Gln Ile Met Ser Ile Leu Leu Thr  
 245                      250                      255  
 Asn Gln Tyr Leu Asp Thr Leu Asn Thr Phe Ala Ser Lys Gly Asn Gln  
 260                      265                      270  
 Thr Ile Phe Leu Pro Asn Thr Pro Asn Gly Val Asp Asp Ile Arg Thr  
 275                      280                      285  
 Gln Ile Leu Ser Ala Leu Arg Ala Glu Lys Lys  
 290                      295  
  
 <210> 737  
 <211> 173  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 737  
 Met Arg Lys Phe Arg Tyr Asn Ser Gln Thr Arg Ser Arg Phe Lys Glu  
 1                      5                      10                      15  
 Arg Gly Gly Phe Val Met Arg Phe Lys Asn Thr Ser Asp His Ile Glu  
 20                      25                      30  
 Ala Tyr Ile Lys Ala Ile Leu Asp Gln Ser Gly Ile Val Glu Leu Gln  
 35                      40                      45  
 Arg Ser Gln Leu Ala Asp Thr Phe Gln Val Val Pro Ser Gln Ile Asn  
 50                      55                      60  
 Tyr Val Ile Lys Thr Arg Phe Thr Glu Ser Arg Gly Tyr Leu Val Glu  
 65                      70                      75                      80  
 Ser Lys Arg Gly Gly Gly Gly Tyr Ile Arg Ile Gly Arg Ile Glu Phe  
 85                      90                      95  
 Ser Ser His His Glu Met Leu Arg Glu Leu Leu Tyr Ser Ile Gly Glu

100 105 110  
 Arg Val Ser Gln Glu Ile Tyr Glu Asp Ile Leu Gln Leu Leu Val Glu  
 115 120 125  
 Gln Glu Leu Met Thr Lys Gln Glu Met Asn Leu Leu Glu Ser Val Ala  
 130 135 140  
 Leu Asp Arg Val Leu Gly Glu Glu Ala Pro Val Val Arg Ala Asn Met  
 145 150 155 160  
 Leu Arg Gln Ile Ile Gln Glu Val Asp Arg Lys Gly Lys  
 165 170  
 <210> 738  
 <211> 150  
 <212> PRT  
 <213> Streptococcus pneumoniae  
 <400> 738  
 Met Lys Val Ile Phe Leu Ala Asp Val Lys Gly Lys Gly Lys Lys Gly  
 1 5 10 15  
 Glu Ile Lys Glu Val Pro Thr Gly Tyr Ala Gln Asn Phe Leu Ile Lys  
 20 25 30  
 Lys Asn Leu Ala Lys Glu Ala Thr Ala Gln Ala Val Gly Glu Leu Arg  
 35 40 45  
 Gly Lys Gln Lys Ser Glu Glu Lys Ala His Ala Glu Met Ile Ala Glu  
 50 55 60  
 Gly Lys Ala Ile Lys Ala Gln Leu Glu Ala Glu Glu Thr Val Val Glu  
 65 70 75 80  
 Phe Val Glu Lys Val Gly Pro Asp Gly Arg Thr Phe Gly Ser Ile Thr  
 85 90 95  
 Asn Lys Lys Ile Ala Glu Glu Leu Gln Lys Gln Phe Gly Ile Lys Ile  
 100 105 110  
 Asp Lys Arg His Ile Gln Val Gln Ala Pro Ile Arg Ala Val Gly Leu

115                      120                      125  
 Ile Asp Val Pro Val Lys Ile Tyr Gln Asp Ile Thr Ser Val Ile Asn  
     130                      135                      140  
  
 Leu Arg Val Lys Glu Gly  
     145                      150  
  
 <210> 739  
 <211> 182  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 739  
  
 Met Ile Lys Tyr Ser Ile Arg Gly Glu Asn Leu Glu Val Thr Glu Ala  
     1                      5                      10                      15  
  
 Ile Arg Asp Tyr Val Val Ser Lys Leu Glu Lys Ile Glu Lys Tyr Phe  
                     20                      25                      30  
  
 Gln Pro Glu Gln Glu Leu Asp Ala Arg Ile Asn Leu Lys Val Tyr Arg  
                     35                      40                      45  
  
 Glu Lys Thr Ala Lys Val Glu Val Thr Ile Pro Leu Gly Ser Ile Thr  
     50                      55                      60  
  
 Leu Arg Ala Glu Asp Val Ser Gln Asp Met Tyr Gly Ser Ile Asp Leu  
     65                      70                      75                      80  
  
 Val Thr Asp Lys Ile Glu Arg Gln Ile Arg Lys Asn Lys Thr Lys Ile  
                     85                      90                      95  
  
 Glu Arg Lys Asn Lys Asn Lys Val Ala Thr Gly Gln Leu Phe Thr Asp  
                     100                      105                      110  
  
 Ala Leu Val Glu Asp Ser Asn Ile Val Gln Ser Lys Val Val Arg Ser  
     115                      120                      125  
  
 Lys Gln Ile Asp Leu Lys Pro Met Asp Leu Glu Glu Ala Ile Leu Gln  
     130                      135                      140  
  
 Met Asp Leu Leu Gly His Asp Phe Phe Ile Tyr Val Asp Val Glu Asp

145                      150                      155                      160  
 Gln Thr Thr Asn Val Ile Tyr Arg Arg Glu Asp Gly Glu Ile Gly Leu  
                                  165                      170                      175  
 Leu Glu Val Lys Glu Ser  
                                  180  
  
 <210> 740  
 <211> 346  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 740  
 Met Ala Glu Ile Thr Ala Lys Leu Val Lys Glu Leu Arg Glu Lys Ser  
 1                      5                      10                      15  
  
 Gly Ala Gly Val Met Asp Ala Lys Lys Ala Leu Val Glu Thr Asp Gly  
                                  20                      25                      30  
  
 Asp Ile Glu Lys Ala Ile Glu Leu Leu Arg Glu Lys Gly Met Ala Lys  
                                  35                      40                      45  
  
 Ala Ala Lys Lys Ala Asp Arg Val Ala Ala Glu Gly Leu Thr Gly Val  
                                  50                      55                      60  
  
 Tyr Val Asn Gly Asn Val Ala Ala Val Ile Glu Val Asn Ala Glu Thr  
 65                      70                      75                      80  
  
 Asp Phe Val Ala Lys Asn Ala Gln Phe Val Glu Leu Val Asn Thr Thr  
                                  85                      90                      95  
  
 Ala Lys Val Ile Ala Glu Gly Lys Pro Ala Asn Asn Glu Glu Ala Leu  
                                  100                      105                      110  
  
 Ala Leu Ile Met Pro Ser Gly Glu Thr Leu Glu Ala Ala Tyr Val Ser  
                                  115                      120                      125  
  
 Ala Thr Ala Thr Ile Gly Glu Lys Ile Ser Phe Arg Arg Phe Ala Leu  
 130                      135                      140  
  
 Ile Glu Lys Thr Asp Ala Gln His Phe Gly Ala Tyr Gln His Asn Gly

145					150					155					160				
Gly	Arg	Ile	Gly	Val	Ile	Ser	Val	Val	Glu	Gly	Gly	Asp	Glu	Ala	Leu				
				165					170					175					
Ala	Lys	Gln	Leu	Ser	Met	His	Ile	Ala	Ala	Met	Lys	Pro	Thr	Val	Leu				
			180					185					190						
Ser	Tyr	Lys	Glu	Leu	Asp	Glu	Gln	Phe	Val	Lys	Asp	Glu	Leu	Ala	Gln				
		195					200					205							
Leu	Asn	His	Val	Ile	Asp	Gln	Asp	Asn	Glu	Ser	Arg	Ala	Met	Val	Asn				
	210					215					220								
Lys	Pro	Ala	Leu	Pro	His	Leu	Lys	Tyr	Gly	Ser	Lys	Ala	Gln	Leu	Thr				
225					230					235					240				
Asp	Asp	Val	Ile	Ala	Gln	Ala	Glu	Ala	Asp	Ile	Lys	Ala	Glu	Leu	Ala				
				245					250					255					
Ala	Glu	Gly	Lys	Pro	Glu	Lys	Ile	Trp	Asp	Lys	Ile	Ile	Pro	Gly	Lys				
			260					265					270						
Met	Asp	Arg	Phe	Met	Leu	Asp	Asn	Thr	Lys	Val	Asp	Gln	Ala	Tyr	Thr				
		275					280					285							
Leu	Leu	Ala	Gln	Val	Tyr	Ile	Met	Asp	Asp	Ser	Lys	Thr	Val	Glu	Ala				
	290					295					300								
Tyr	Leu	Glu	Ser	Val	Asn	Ala	Ser	Val	Val	Glu	Phe	Ala	Arg	Phe	Glu				
305					310					315					320				
Val	Gly	Glu	Gly	Ile	Glu	Lys	Ala	Ala	Asn	Asp	Phe	Glu	Ala	Glu	Val				
				325					330					335					
Ala	Ala	Thr	Met	Ala	Ala	Ala	Leu	Asn	Asn										
			340					345											

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<210> 741
<211> 286
<212> PRT
<213> Streptococcus pneumoniae
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&lt;400&gt; 741

Met Asn Cys Glu Ala Val Ala Leu Gly Ser Phe Cys Glu Leu Lys Ser  
 1 5 10 15

Arg Arg Gly Lys Lys Gln Lys Gly Glu Ile Leu Met Ala Val Ile Ser  
 20 25 30

Met Lys Gln Leu Leu Glu Ala Gly Val His Phe Gly His Gln Thr Arg  
 35 40 45

Arg Trp Asn Pro Lys Met Ala Lys Tyr Ile Phe Thr Glu Arg Asn Gly  
 50 55 60

Ile His Val Ile Asp Leu Gln Gln Thr Val Lys Tyr Ala Asp Gln Ala  
 65 70 75 80

Tyr Asp Phe Met Arg Asp Ala Ala Ala Asn Asp Ala Val Val Leu Phe  
 85 90 95

Val Gly Thr Lys Lys Gln Ala Ala Asp Ala Val Ala Glu Glu Ala Val  
 100 105 110

Arg Ser Gly Gln Tyr Phe Ile Asn His Arg Trp Leu Gly Gly Thr Leu  
 115 120 125

Thr Asn Trp Gly Thr Ile Gln Lys Arg Ile Ala Arg Leu Lys Glu Ile  
 130 135 140

Lys Arg Met Glu Glu Asp Gly Thr Phe Glu Val Leu Pro Lys Lys Glu  
 145 150 155 160

Val Ala Leu Leu Asn Lys Gln Arg Ala Arg Leu Glu Lys Phe Leu Gly  
 165 170 175

Gly Ile Glu Asp Met Pro Arg Ile Pro Asp Val Met Tyr Val Val Asp  
 180 185 190

Pro His Lys Glu Gln Ile Ala Val Lys Glu Ala Lys Lys Leu Gly Ile  
 195 200 205

Pro Val Val Ala Met Val Asp Thr Asn Thr Asp Pro Asp Asp Ile Asp  
 210 215 220

Val Ile Ile Pro Ala Asn Asp Asp Ala Ile Arg Ala Val Lys Leu Ile  
 225 230 235 240

Thr Ala Lys Leu Ala Asp Ala Ile Ile Glu Gly Arg Gln Gly Glu Asp  
 245 250 255

Ala Val Ala Val Glu Ala Glu Phe Ala Ala Leu Glu Thr Gln Ala Asp  
 260 265 270

Ser Ile Glu Glu Ile Val Glu Val Val Glu Gly Asp Asn Ala  
 275 280 285

<210> 742

<211> 272

<212> PRT

<213> Streptococcus pneumoniae

<400> 742

Met Asn Arg Phe Lys Lys Ser Lys Tyr Val Ile Ile Val Phe Val Thr  
 1 5 10 15

Val Leu Leu Val Ser Ala Leu Leu Ala Thr Thr Tyr Ser Ser Thr Ile  
 20 25 30

Val Thr Lys Leu Gly Asp Gly Ile Ser Leu Val Asp Arg Val Val Gln  
 35 40 45

Lys Pro Phe Gln Trp Phe Asp Ser Val Lys Ser Asp Leu Ala His Leu  
 50 55 60

Thr Arg Thr Tyr Asn Glu Asn Glu Ser Leu Lys Lys Gln Leu Tyr Gln  
 65 70 75 80

Leu Glu Val Lys Ser Asn Glu Val Glu Ser Leu Lys Thr Glu Asn Glu  
 85 90 95

Gln Leu Arg Gln Leu Leu Asp Met Lys Ser Lys Leu Gln Ala Thr Lys  
 100 105 110

Thr Leu Ala Ala Asp Val Ile Met Arg Ser Pro Val Ser Trp Lys Gln  
 115 120 125

Glu Leu Thr Leu Asp Ala Gly Arg Ser Lys Gly Ala Ser Glu Asn Met  
 130 135 140

Leu Ala Ile Ala Asn Gly Gly Leu Ile Gly Ser Val Ser Lys Val Glu  
 145 150 155 160

Glu Asn Ser Thr Ile Val Asn Leu Leu Thr Asn Thr Glu Asn Ala Asp  
 165 170 175

Lys Ile Ser Val Lys Ile Gln His Gly Ser Thr Thr Ile Tyr Gly Ile  
 180 185 190

Ile Ile Gly Tyr Asp Lys Glu Asn Asp Val Leu Lys Ile Ser Gln Leu  
 195 200 205

Asn Ser Asn Ser Asp Ile Ser Ala Gly Asp Lys Val Thr Thr Gly Gly  
 210 215 220

Leu Gly Asn Phe Asn Val Ala Asp Ile Pro Val Gly Glu Val Val Ala  
 225 230 235 240

Thr Thr His Ser Thr Asp Tyr Leu Thr Arg Glu Val Thr Val Lys Leu  
 245 250 255

Ser Ala Asp Thr His Asn Val Asp Val Ile Glu Leu Val Gly Asn Ser  
 260 265 270

<210> 743

<211> 275

<212> PRT

<213> Streptococcus pneumoniae

<400> 743

Met Lys Ser Ile Ile Asp Val Lys Asn Leu Ser Phe Arg Tyr Lys Glu  
 1 5 10 15

Asn Gln Asn Tyr Tyr Asp Val Lys Asp Ile Thr Phe His Val Lys Arg  
 20 25 30



Gly Glu Trp Leu Ser Ile Val Gly His Asn Gly Ser Gly Lys Ser Thr  
 35 40 45  
 Thr Val Arg Leu Ile Asp Gly Leu Leu Glu Ala Glu Ser Gly Glu Ile  
 50 55 60  
 Val Ile Asp Gly Gln Arg Leu Thr Glu Glu Asn Val Trp Asn Ile Arg  
 65 70 75 80  
 Arg Gln Ile Gly Met Val Phe Gln Asn Pro Asp Asn Gln Phe Val Gly  
 85 90 95  
 Ala Thr Val Glu Asp Asp Val Ala Phe Gly Leu Glu Asn Gln Gly Leu  
 100 105 110  
 Ser Arg Gln Glu Met Lys Lys Arg Val Glu Glu Ala Leu Ala Leu Val  
 115 120 125  
 Gly Met Leu Asp Phe Lys Lys Arg Glu Pro Ala Arg Leu Ser Gly Gly  
 130 135 140  
 Gln Lys Gln Arg Val Ala Ile Ala Gly Val Val Ala Leu Arg Pro Ala  
 145 150 155 160  
 Ile Leu Ile Leu Asp Glu Ala Thr Ser Met Leu Asp Pro Glu Gly Arg  
 165 170 175  
 Arg Glu Leu Ile Gly Thr Val Lys Gly Ile Arg Lys Asp Tyr Asp Met  
 180 185 190  
 Thr Val Ile Ser Ile Thr His Asp Leu Glu Glu Val Ala Met Ser Asp  
 195 200 205  
 Arg Val Leu Val Met Lys Lys Gly Glu Ile Glu Ser Thr Ser Ser Pro  
 210 215 220  
 Arg Glu Leu Phe Ser Arg Asn Asp Leu Asp Gln Ile Gly Leu Asp Asp  
 225 230 235 240  
 Pro Phe Ala Asn Gln Leu Lys Lys Ser Leu Ser Gln Asn Gly Tyr Asp  
 245 250 255

Leu Pro Glu Asn Tyr Leu Thr Glu Ser Glu Leu Glu Asp Lys Leu Trp  
 260 265 270

Glu Leu Leu  
 275

<210> 744  
 <211> 276  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 744

Met Thr Ser Met Arg Lys Lys Thr Ile Gly Glu Val Leu Arg Leu Ala  
 1 5 10 15

Arg Ile Asn Gln Gly Leu Ser Leu Asp Glu Leu Gln Lys Lys Thr Glu  
 20 25 30

Ile Gln Leu Asp Met Leu Glu Ala Met Glu Ala Asp Asp Phe Asp Gln  
 35 40 45

Leu Pro Ser Pro Phe Tyr Thr Arg Ser Phe Leu Lys Lys Tyr Ala Trp  
 50 55 60

Ala Val Glu Leu Asp Asp Gln Ile Val Leu Asp Ala Tyr Asp Ser Gly  
 65 70 75 80

Ser Met Ile Thr Tyr Glu Glu Val Asp Val Asp Glu Asp Glu Leu Thr  
 85 90 95

Gly Arg Arg Arg Ser Ser Lys Lys Lys Lys Lys Thr Ser Phe Leu  
 100 105 110

Pro Leu Phe Tyr Phe Ile Leu Phe Ala Leu Ser Ile Leu Ile Phe Val  
 115 120 125

Thr Tyr Tyr Val Trp Asn Tyr Ile Gln Thr Gln Pro Glu Glu Pro Ser  
 130 135 140

Leu Ser Asn Tyr Ser Val Val Gln Ser Thr Ser Ser Thr Ser Ser Val  
 145 150 155 160

Pro His Ser Ser Ser Ser Ser Ser Ser Ser Ile Glu Ser Ala Ile Ser  
165 170 175

Val	Ser	Gly	Glu	Gly	Asn	His	Val	Glu	Ile	Ala	Tyr	Lys	Thr	Ser	Lys
			180					185					190		

Glu Thr Val Lys Leu Gln Leu Ala Val Ser Asp Val Thr Ser Trp Val  
195 200 205

Ser Val Ser Glu Ser Glu Leu Glu Gly Gly Val Thr Leu Ser Pro Lys  
210 215 220

Lys Lys Ser Ala Glu Ala Thr Val Ala Thr Lys Ser Pro Val Thr Ile  
225 230 235 240

Thr Leu Gly Val Val Lys Gly Val Asp Leu Thr Val Asp Asn Gln Thr  
245 250 255

Val Asp Leu Ser Lys Leu Thr Ala Gln Thr Gly Gln Ile Thr Val Thr  
260 265 270

Phe Thr Lys Asn  
275

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<210> 745
<211> 339
<212> PRT
<213> Streptococcus pneumoniae
```

<400> 745

Met Glu Asn Leu Val Lys Ser Thr Ser Tyr Thr Tyr Ile Pro Glu Glu  
1 5 10 15

Ile Met Ser Phe Ser Asp Leu Lys Leu Phe Ala Leu Ser Ser Asn Lys  
20 25 30

Glu Leu Ala Glu Arg Val Ala Gln Glu Ile Gly Ile Glu Leu Gly Lys  
35 40 45

Ser Ser Val Arg Gln Phe Ser Asp Gly Glu Ile Gln Val Asn Ile Glu  
50 55 60

Glu Ser Ile Arg Gly Lys His Val Phe Ile Leu Gln Ser Thr Ser Ser  
65 70 75 80

Pro Val Asn Asp Asn Leu Leu Glu Ile Leu Ile Met Val Asp Ala Leu  
85 90 95

Lys Arg Ala Ser Ala Glu Ser Val Asn Val Val Met Pro Tyr Tyr Gly  
100 105 110

Tyr Ala Arg Gln Asp Arg Lys Ala Arg Ala Arg Glu Pro Ile Thr Ser  
115 120 125

Lys Leu Val Ala Asn Met Leu Glu Val Ala Gly Val Asp Arg Leu Leu  
130 135 140

Thr Ile Asp Leu His Ala Ala Gln Ile Gln Gly Phe Phe Asp Ile Pro  
145 150 155 160

Val Asp His Leu Met Gly Ala Pro Leu Ile Ala Asp Tyr Phe Glu Arg  
165 170 175

Arg Gly Met Val Gly Ser Asp Tyr Val Val Val Ser Pro Asp His Gly  
180 185 190

Gly Val Thr Arg Ala Arg Lys Leu Ala Glu Phe Leu Lys Thr Ser Ile  
195 200 205

Ala Ile Ile Asp Lys Arg Arg Ser Val Asp Lys Met Asn Thr Ser Glu  
210 215 220

Val Met Asn Ile Ile Gly Lys Val Glu Gly Lys Thr Cys Ile Leu Ile  
225 230 235 240

Asp Asp Met Ile Asp Thr Ala Gly Thr Ile Cys His Ala Ala Asp Ala  
245 250 255

Leu Ala Glu Ala Gly Ala Val Glu Val Tyr Ala Ser Cys Thr His Pro  
260 265 270

Val Leu Ser Gly Pro Ala Thr Asp Asn Ile Gln Lys Ser Ala Ile Lys  
275 280 285

Lys Leu Val Val Leu Asp Thr Ile Tyr Leu Pro Glu Glu Arg Leu Ile  
 290 295 300

Asp Lys Ile Glu Gln Ile Ser Ile Ala His Leu Leu Gly Asp Ala Ile  
 305 310 315 320

Val Arg Ile His Glu Lys Arg Pro Leu Ser Pro Leu Phe Asp Ile Glu  
 325 330 335

Lys Lys Ile

<210> 746

<211> 220

<212> PRT

<213> Streptococcus pneumoniae

<400> 746

Met Asp Leu Thr Lys Arg Phe Asn Lys Gln Leu Asp Lys Ile Gln Val  
 1 5 10 15

Ser Leu Ile Arg Gln Phe Asp Gln Ala Ile Ser Glu Ile Pro Gly Val  
 20 25 30

Leu Arg Leu Thr Leu Gly Glu Pro Asp Phe Thr Thr Pro Asp His Val  
 35 40 45

Lys Glu Ala Gly Lys Arg Ala Ile Asp Gln Asn Gln Ser Tyr Tyr Thr  
 50 55 60

Gly Met Ser Gly Leu Leu Thr Leu Arg Gln Ala Ala Ser Asp Phe Val  
 65 70 75 80

Lys Glu Lys Tyr Gln Leu Asp Tyr Ala Pro Glu Asn Glu Ile Leu Val  
 85 90 95

Thr Ile Gly Ala Thr Glu Ala Leu Ser Ala Thr Leu Thr Ala Ile Leu  
 100 105 110

Glu Glu Gly Asp Lys Val Leu Leu Pro Ala Pro Ala Tyr Pro Gly Tyr  
 115 120 125

Glu Pro Ile Val Asn Leu Val Gly Ala Glu Ile Val Glu Ile Asp Thr  
 130 135 140

Thr Glu Asn Gly Phe Val Leu Thr Pro Glu Met Leu Glu Lys Ala Ile  
 145 150 155 160

Leu Glu Gln Gly Asp Lys Leu Lys Ala Val Ile Leu Asn Tyr Pro Ala  
 165 170 175

Asn Pro Thr Gly Ile Thr Tyr Ser Arg Glu Gln Leu Glu Ala Leu Ala  
 180 185 190

Ala Val Leu Arg Lys Tyr Glu Ile Phe Val Val Cys Asp Glu Val Tyr  
 195 200 205

Ser Glu Leu Thr Tyr Thr Gly Glu Ala Met Cys Leu  
 210 215 220

<210> 747

<211> 432

<212> PRT

<213> Streptococcus pneumoniae

<400> 747

Met Ile Asn Arg Tyr Ser Arg Pro Glu Met Ala Asn Ile Trp Ser Glu  
 1 5 10 15

Glu Asn Lys Tyr Arg Ala Trp Leu Glu Val Glu Ile Leu Ser Asp Glu  
 20 25 30

Ala Trp Ala Glu Leu Gly Glu Ile Pro Lys Glu Asp Val Ala Leu Ile  
 35 40 45

Arg Lys Lys Ala Asp Phe Asp Ile Asp Arg Ile Leu Glu Ile Glu Gln  
 50 55 60

Glu Thr Arg His Asp Val Val Ala Phe Thr Arg Ala Val Ser Glu Thr  
 65 70 75 80

Leu Gly Glu Glu Arg Lys Trp Val His Tyr Gly Leu Thr Ser Thr Asp  
 85 90 95

Val Val Asp Thr Ala Tyr Gly Tyr Leu Tyr Lys Gln Ala Asn Asp Ile  
 100 105 110

Ile Arg Arg Asp Leu Glu Asn Phe Thr Asn Ile Ile Ala Asp Lys Ala  
 115 120 125

Lys Glu His Lys Phe Thr Ile Met Met Gly Arg Thr His Gly Val His  
 130 135 140

Ala Glu Pro Thr Thr Phe Gly Leu Lys Leu Ala Thr Trp Tyr Ser Glu  
 145 150 155 160

Met Lys Arg Asn Ile Glu Arg Phe Glu His Ala Ala Ala Gly Val Glu  
 165 170 175

Ala Gly Lys Ile Ser Gly Ala Val Gly Asn Phe Ala Asn Ile Pro Pro  
 180 185 190

Phe Val Glu Glu Tyr Val Cys Asp Lys Leu Gly Ile Arg Ala Gln Glu  
 195 200 205

Ile Ser Thr Gln Val Leu Pro Arg Asp Leu His Ala Glu Tyr Phe Ala  
 210 215 220

Val Leu Ala Ser Ile Ala Thr Ser Ile Glu Arg Met Ala Thr Glu Ile  
 225 230 235 240

Arg Gly Leu Gln Lys Ser Glu Gln Arg Glu Val Glu Glu Phe Phe Ala  
 245 250 255

Lys Gly Gln Lys Gly Ser Ser Ala Met Pro His Lys Arg Asn Pro Ile  
 260 265 270

Gly Ser Glu Asn Met Thr Gly Leu Ala Arg Val Ile Arg Gly His Met  
 275 280 285

Ile Thr Ala Tyr Glu Asn Val Ala Leu Trp His Glu Arg Asp Ile Ser  
 290 295 300

His Ser Ser Ala Glu Arg Ile Ile Thr Pro Asp Thr Thr Ile Leu Ile

305                      310                      315                      320  
 Asp Tyr Met Leu Asn Arg Phe Gly Asn Ile Val Lys Asn Leu Thr Val  
                                  325                                   330                                   335  
 Phe Pro Glu Asn Met Ile Arg Asn Met Asn Ser Thr Phe Gly Leu Ile  
                                  340                                   345                                   350  
 Phe Ser Gln Arg Ala Met Leu Thr Leu Ile Glu Lys Gly Met Thr Arg  
                                  355                                   360                                   365  
 Glu Gln Ala Tyr Asp Leu Val Gln Pro Lys Thr Ala Tyr Ser Trp Asp  
                                  370                                   375                                   380  
 Asn Gln Val Asp Phe Lys Pro Leu Leu Glu Ala Asp Ser Glu Val Thr  
                                  385                                   390                                   395                                   400  
 Ser Arg Leu Thr Gln Glu Glu Ile Asp Glu Ile Phe Asn Pro Val Tyr  
                                  405                                   410                                   415  
 Tyr Thr Lys Arg Val Asp Asp Ile Phe Glu Arg Leu Gly Leu Gly Asp  
                                  420                                   425                                   430  
  
 <210> 748  
 <211> 301  
 <212> PRT  
 <213> Streptococcus pneumoniae  
  
 <400> 748  
 Met Ile Gln Trp Trp Gln Ile Leu Leu Leu Thr Leu Tyr Ser Ala Tyr  
 1                                   5                                   10                                   15  
  
 Gln Ile Cys Asp Glu Leu Thr Ile Val Ser Ser Ala Gly Ser Pro Val  
                                  20                                   25                                   30  
  
 Phe Ala Gly Phe Ile Thr Gly Leu Ile Met Gly Asp Val Thr Thr Gly  
                                  35                                   40                                   45  
  
 Leu Leu Ile Gly Gly Asn Leu Gln Leu Phe Val Leu Gly Val Gly Thr  
                                  50                                   55                                   60  
  
 Phe Gly Gly Ala Ser Arg Ile Asp Ala Thr Ser Gly Ala Val Leu Ala



65		70		75		80									
Thr	Ala	Phe	Ser	Val	Ser	Gln	Gly	Ile	Asp	Ala	Pro	Leu	Ala	Ile	Thr
			85						90					95	
Thr	Ile	Ala	Val	Pro	Val	Ala	Ala	Leu	Leu	Thr	Tyr	Phe	Asp	Val	Leu
			100					105					110		
Gly	Arg	Met	Thr	Thr	Thr	Phe	Phe	Ala	His	Arg	Val	Asp	Ala	Ala	Ile
		115						120				125			
Glu	Arg	Phe	Asp	Tyr	Lys	Gly	Ile	Glu	Arg	Asn	Tyr	Leu	Leu	Gly	Ala
		130				135					140				
Ile	Pro	Trp	Ala	Leu	Ser	Arg	Ala	Leu	Pro	Val	Phe	Phe	Ala	Leu	Ala
145					150					155					160
Phe	Gly	Gly	Ala	Phe	Val	Gln	Ser	Val	Val	Asp	Phe	Val	Glu	Ala	Tyr
				165						170				175	
Lys	Trp	Val	Ala	Asp	Gly	Leu	Thr	Leu	Ala	Gly	Arg	Met	Leu	Pro	Gly
			180						185				190		
Leu	Gly	Phe	Ala	Ile	Leu	Leu	Arg	Tyr	Leu	Pro	Val	Lys	Arg	Asn	Leu
		195					200					205			
His	Tyr	Leu	Ala	Met	Gly	Phe	Gly	Leu	Thr	Ala	Met	Leu	Thr	Val	Leu
	210					215					220				
Tyr	Ser	Tyr	Val	Thr	Gly	Leu	Gly	Gly	Ala	Val	Ala	Gly	Ile	Val	Gly
225					230					235				240	
Thr	Leu	Pro	Ala	Glu	Val	Ala	Glu	Lys	Ile	Gly	Phe	Val	Asn	Asn	Phe
				245					250					255	
Lys	Gly	Leu	Ser	Met	Ile	Gly	Ile	Ser	Ile	Val	Gly	Ile	Phe	Leu	Ala
			260					265					270		
Val	Leu	His	Phe	Lys	Asn	Ser	Gln	Lys	Val	Ala	Val	Ala	Ala	Pro	Ser
		275					280					285			

Thr Pro Ser Glu Ser Gly Glu Ile Glu Asp Asp Glu Phe  
 290 295 300

<210> 749

<211> 276

<212> PRT

<213> Streptococcus pneumoniae

<400> 749

Met Gly Lys Ser Lys Met Thr Asn Ser Asn Tyr Lys Leu Thr Lys Glu  
 1 5 10 15

Asp Phe Asn Gln Ile Asn Lys Arg Ser Leu Phe Thr Phe Gln Leu Gly  
 20 25 30

Trp Asn Tyr Glu Arg Met Gln Ala Ser Gly Tyr Leu Tyr Met Ile Leu  
 35 40 45

Pro Gln Leu Arg Lys Met Tyr Gly Asp Gly Thr Pro Glu Leu Lys Glu  
 50 55 60

Met Met Lys Val His Thr Gln Phe Phe Asn Thr Ser Pro Phe Phe His  
 65 70 75 80

Thr Ile Ile Ala Gly Phe Asp Leu Ala Met Glu Glu Lys Asp Gly Val  
 85 90 95

Gly Ser Lys Asp Ala Val Asn Gly Ile Lys Thr Gly Leu Met Gly Pro  
 100 105 110

Phe Ala Pro Leu Gly Asp Thr Ile Phe Gly Ser Leu Val Pro Ala Ile  
 115 120 125

Met Gly Ser Val Ala Ala Thr Met Ala Ile Ala Gly Gln Pro Trp Gly  
 130 135 140

Ile Phe Leu Trp Ile Ala Val Ala Val Ala Tyr Asp Ile Phe Arg Trp  
 145 150 155 160

Lys Gln Leu Glu Phe Ala Tyr Lys Glu Gly Val Asn Leu Ile Asn Asn  
 165 170 175

Met Gln Ser Thr Leu Thr Ala Leu Ile Asp Ala Ala Ser Val Leu Gly  
                   180                                  185                                  190

Val Phe Met Met Gly Ala Leu Val Ala Thr Val Ile Asn Phe Glu Ile  
                   195                                  200                                  205

Ser Tyr Lys Leu Pro Ile Gly Glu Lys Met Ile Asp Phe Gln Asp Ile  
                   210                                  215                                  220

Leu Asn Gln Ile Phe Pro Arg Leu Leu Pro Ala Ile Phe Thr Ala Phe  
                   225                                  230                                  235                                  240

Ile Phe Trp Leu Leu Gly Lys Lys Gly Met Asn Ser Thr Lys Ala Ile  
                                   245                                  250                                  255

Gly Ile Ile Ile Val Leu Ala Leu Ala Leu Ser Ala Leu Gly His Phe  
                                   260                                  265                                  270

Ala Leu Gly Met  
                   275

<210> 750

<211> 388

<212> PRT

<213> Streptococcus pneumoniae

<400> 750

Met Leu His Tyr Thr Lys Glu Asp Leu Leu Glu Leu Gly Ala Glu Ile  
   1                                  5                                  10                                  15

Thr Thr Arg Glu Ile Tyr Gln Gln Pro Asp Val Trp Arg Glu Ala Phe  
                   20                                  25                                  30

Glu Phe Tyr Gln Ala Lys Arg Glu Glu Ile Ala Ala Phe Leu Gln Glu  
                   35                                  40                                  45

Ile Ala Asp Lys His Asp Tyr Ile Lys Val Ile Leu Thr Gly Ala Gly  
                   50                                  55                                  60

Thr Ser Ala Tyr Val Gly Asp Thr Leu Leu Pro Tyr Phe Lys Glu Val  
   65                                  70                                  75                                  80

Tyr Asp Glu Arg Lys Trp Asn Phe Asn Ala Ile Ala Thr Thr Asp Ile  
85 90 95

Val Ala Asn Pro Ala Thr Tyr Leu Lys Lys Asp Val Ala Thr Val Leu  
100 105 110

Val Ser Phe Ala Arg Ser Gly Asn Ser Pro Glu Ser Leu Ala Thr Val  
115 120 125

Asp Leu Ala Lys Ser Leu Val Asp Glu Leu Tyr Gln Val Thr Ile Thr  
130 135 140

Cys Ala Ala Asp Gly Lys Leu Ala Leu Gln Ala His Gly Asp Asp Arg  
145 150 155 160

Asn Leu Leu Leu Leu Gln Pro Ala Val Ser Asn Asp Ala Gly Phe Ala  
165 170 175

Met Thr Ser Ser Phe Thr Ser Met Met Leu Thr Thr Leu Leu Val Phe  
180 185 190

Asp Pro Thr Glu Phe Ala Val Lys Ser Glu Arg Phe Glu Val Val Ser  
195 200 205

Ser Leu Ala Arg Lys Val Leu Asp Lys Ala Glu Asp Val Lys Glu Leu  
210 215 220

Val Asp Leu Asp Phe Asn Arg Val Ile Tyr Leu Gly Ala Gly Pro Phe  
225 230 235 240

Phe Gly Leu Ala His Glu Ala Gln Leu Lys Ile Leu Glu Leu Thr Ala  
245 250 255

Gly Gln Val Ala Thr Met Tyr Glu Ser Pro Val Gly Phe Arg His Gly  
260 265 270

Pro Lys Ser Leu Ile Asn Asp Asn Thr Val Val Leu Val Phe Gly Thr  
275 280 285

Thr Thr Asp Tyr Thr Arg Lys Tyr Asp Leu Asp Leu Val Arg Glu Val  
290 295 300

Ala Gly Asp Gln Ile Ala Arg Arg Val Val Leu Leu Ser Asp Gln Ala  
 305 310 315 320

Phe Gly Leu Glu Asn Val Lys Glu Val Ala Leu Gly Cys Gly Gly Val  
 325 330 335

Leu Asn Asp Ile Tyr Arg Val Phe Pro Tyr Ile Val Tyr Ala Gln Leu  
 340 345 350

Phe Ala Leu Leu Thr Ser Leu Lys Val Glu Asn Lys Pro Asp Thr Pro  
 355 360 365

Ser Pro Thr Gly Thr Val Asn Arg Val Val Gln Gly Val Ile Ile His  
 370 375 380

Glu Tyr Gln Lys  
 385

<210> 751  
 <211> 203  
 <212> PRT  
 <213> Streptococcus pneumoniae

<400> 751

Met Ser Arg Tyr Thr Gly Pro Ser Trp Lys Gln Ala Arg Arg Leu Gly  
 1 5 10 15

Leu Ser Leu Thr Gly Thr Gly Lys Glu Leu Ala Arg Arg Asn Tyr Val  
 20 25 30

Pro Gly Gln His Gly Pro Asn Asn Arg Ser Lys Leu Ser Glu Tyr Gly  
 35 40 45

Leu Gln Leu Ala Glu Lys Gln Lys Leu Arg Phe Thr Tyr Gly Val Gly  
 50 55 60

Glu Lys Gln Phe Arg Asn Leu Phe Val Gln Ala Thr Lys Ile Lys Gly  
 65 70 75 80

Gly Ile Leu Gly Phe Asn Phe Met Leu Leu Leu Glu Arg Arg Leu Asp  
 85 90 95

Asn Val Val Tyr Arg Leu Gly Leu Ala Thr Thr Arg Arg Gln Ala Arg  
 100 105 110

Gln Phe Val Asn His Gly His Ile Leu Val Asp Gly Lys Arg Val Asp  
 115 120 125

Ile Pro Ser Tyr Arg Val Thr Pro Gly Gln Val Ile Ser Val Arg Glu  
 130 135 140

Lys Ser Leu Lys Val Pro Ala Ile Leu Glu Ala Val Glu Ala Thr Leu  
 145 150 155 160

Gly Arg Pro Ala Phe Val Ser Phe Asp Ala Glu Lys Leu Glu Gly Ser  
 165 170 175

Leu Thr Arg Leu Pro Glu Arg Asp Glu Ile Asn Pro Glu Ile Asn Glu  
 180 185 190

Ala Leu Val Val Glu Phe Tyr Asn Lys Met Leu  
 195 200

<210> 752

<211> 328

<212> PRT

<213> Streptococcus pneumoniae

<400> 752

Met Ala Lys Asp Ile Arg Val Leu Leu Tyr Tyr Leu Tyr Thr Pro Ile  
 1 5 10 15

Glu Asn Ala Glu Gln Phe Ala Ala Asp His Leu Ala Phe Cys Lys Ser  
 20 25 30

Ile Gly Leu Lys Gly Arg Ile Leu Val Ala Asp Glu Gly Ile Asn Gly  
 35 40 45

Thr Val Ser Gly Asp Tyr Glu Thr Thr Gln Lys Tyr Met Asp Tyr Val  
 50 55 60

His Ser Leu Pro Gly Met Glu Glu Leu Trp Phe Lys Ile Asp Glu Glu  
 65 70 75 80

Asn Glu Gln Ala Phe Lys Lys Met Phe Val Arg Tyr Lys Lys Glu Ile  
                     85                                    90                                    95

Val His Leu Gly Leu Glu Asp Asn Asp Phe Asp Asn Asp Ile Asn Pro  
                     100                                    105                                    110

Leu Glu Thr Thr Gly Ala Tyr Leu Ser Pro Lys Glu Phe Lys Glu Ala  
                     115                                    120                                    125

Leu Leu Asp Lys Asp Thr Val Val Leu Asp Thr Arg Asn Asp Tyr Glu  
                     130                                    135                                    140

Tyr Asp Leu Gly His Phe Arg Gly Ala Ile Arg Pro Asp Ile Arg Asn  
 145                                    150                                    155                                    160

Phe Arg Glu Leu Pro Gln Trp Val Arg Asp Asn Lys Glu Lys Phe Met  
                     165                                    170                                    175

Asp Lys Arg Val Val Val Tyr Cys Thr Gly Gly Val Arg Cys Glu Lys  
                     180                                    185                                    190

Phe Ser Gly Trp Met Val Arg Glu Gly Tyr Lys Asp Val Gly Gln Leu  
                     195                                    200                                    205

His Gly Gly Ile Ala Thr Tyr Gly Lys Asp Pro Glu Val Gln Gly Glu  
                     210                                    215                                    220

Leu Trp Asp Gly Lys Met Tyr Val Phe Asp Glu Arg Ile Ala Val Asp  
 225                                    230                                    235                                    240

Val Asn His Val Asn Pro Thr Ile Val Gly Lys Asp Trp Phe Asp Gly  
                     245                                    250                                    255

Thr Pro Cys Glu Arg Tyr Val Asn Cys Gly Asn Pro Phe Cys Asn Arg  
                     260                                    265                                    270

Arg Ile Leu Thr Ser Glu Glu Asn Glu Asp Lys Tyr Leu Arg Gly Cys  
                     275                                    280                                    285

Ser His Glu Cys Arg Val His Pro Arg Asn Arg Tyr Val Ser Lys Asn  
                     290                                    295                                    300

Glu Leu Thr Gln Ala Glu Val Ile Glu Arg Leu Ala Ala Ile Gly Glu  
305 310 315 320

Ser Leu Asp Gln Ala Ala Thr Val  
325